Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

MARCH 1955

One of Five Specialized Railway Age Publications

DEPENDABLE
FAST
SAFE

MINER

POWER HAND BRAKE

PATTERN D-3 O-XL

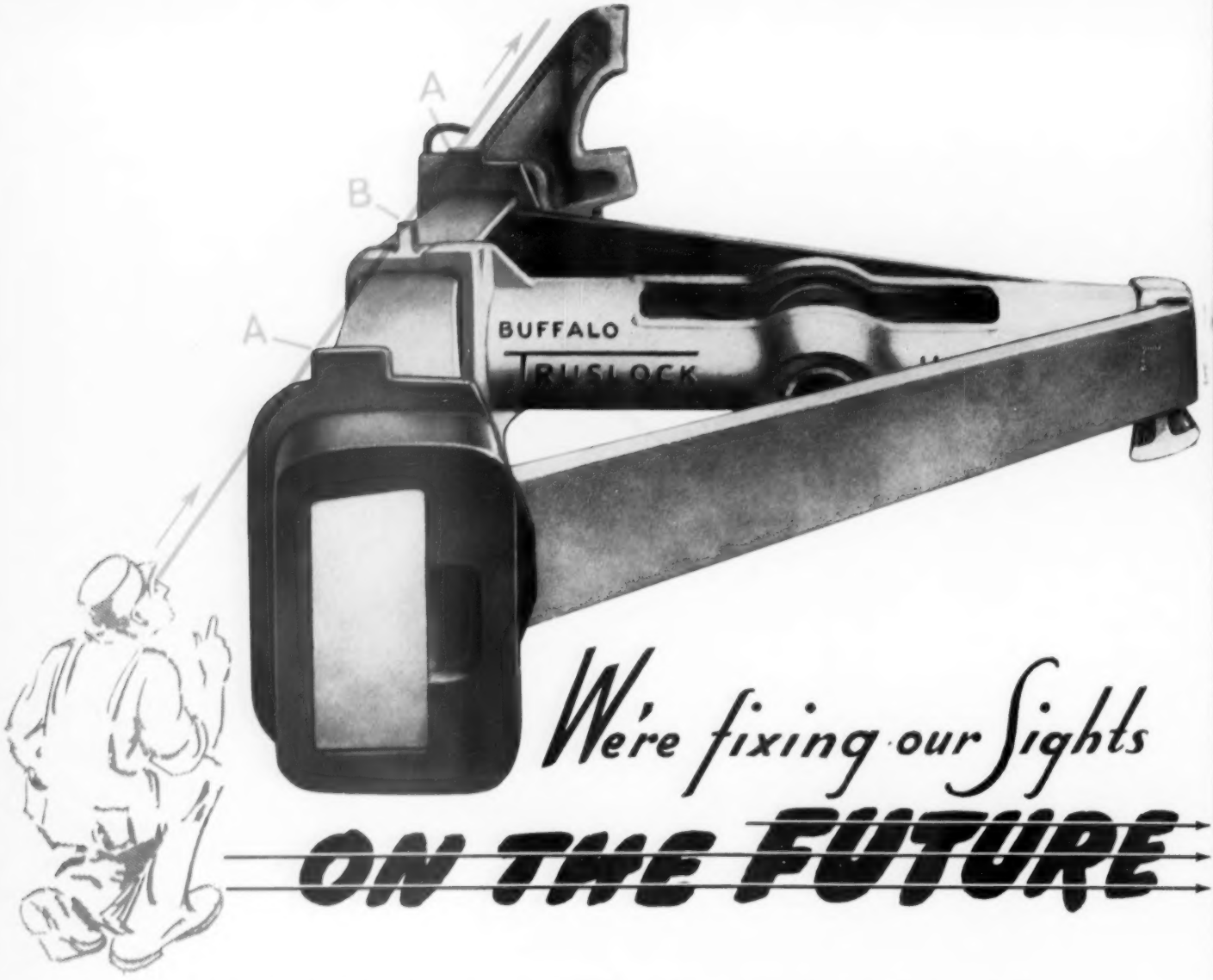
W. H. MINER, I CHICAGO

FRISCO maintenance

FRISCO operation

FRISCO personnel

In this issue —



We're fixing our Sights

ON THE FUTURE

Truslock's integral sighting points for determining brake beam camber at any time without the use of gauges or special tools is just another BUFFALO design for the future. Tomorrow's freight car brake rigging must be easy to inspect – simple to maintain – to assure shippers the fast, economical service that has made the American railroads the world's greatest transportation system.

BUFFALO BRAKE BEAM COMPANY

NEW YORK • BUFFALO • HAMILTON, ONT.

FRISCO

Keeps Diesel Interiors "Clean-as-a-Whistle" with Oakite Composition No. 72

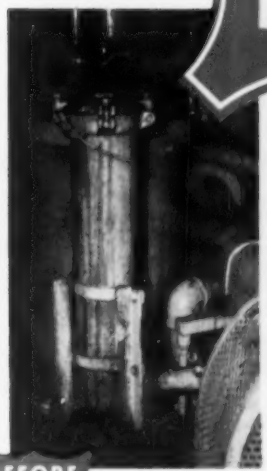
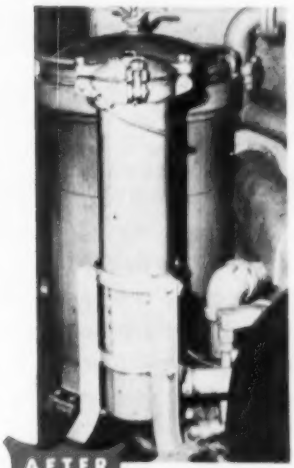


Photo shows diesel filter units before spray-cleaned with Oakite 72.



Same units showing efficiency of Oakite spray-cleaning and rinsing.

Sticklers for absolute cleanliness, FRISCO keeps its diesel engine rooms spotless. They know that cleanliness contributes importantly to mechanical operating efficiency and safety.

FRISCO uses Oakite Composition No. 72 for this important maintenance operation because...

Oakite Composition No. 72 is

SAFE	**It's water-mixed... safe for personnel and paint**
SPEEDY	**Superior wetting action speeds soil penetration and removal**
ODORLESS	**Pleasant to use even in confined cab areas**
VERSATILE	**Use it for washing diesel interiors, exteriors, coaches, headlinings, sidelinings.**
SAVES	**storage space, reduces inventory**
ECONOMICAL	**Water-mixed solutions cost just pennies per gallon**

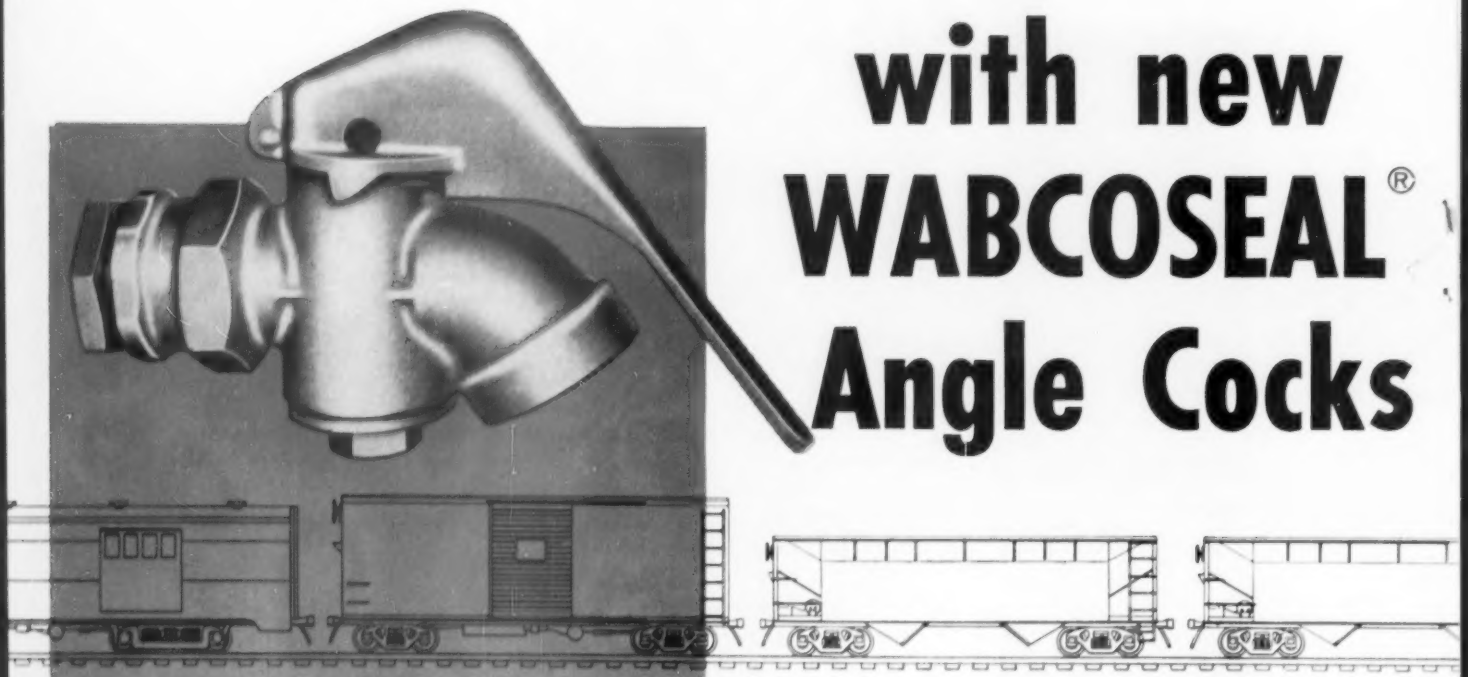
And, in addition to Oakite 72, FRISCO uses Oakite 19 for parts cleaning; Oakite 61 for filter conditioning; Oakite 20 for steam cleaning diesel engine bases; Oakite 88 for mechanical coach washing.

For complete story on money-saving Oakite Cleaning send for FREE Booklet "How to make sure of the best in Railroad Cleaning." Oakite Products, Inc., 46 Rector Street, New York 6, New York.

OAKITE

RAILWAY DIVISION

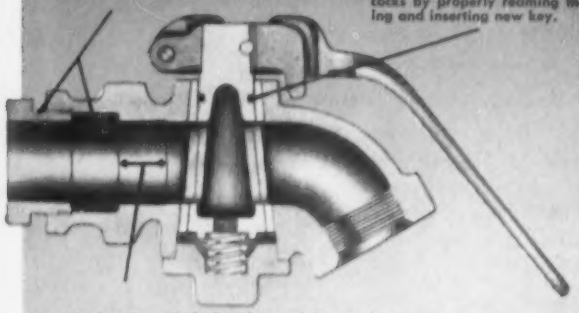
Stop those air leaks with new WABCOSEAL® Angle Cocks



FOR FREIGHT CARS:

Wabco compression ring grips pipe when nut is tightened to provide tight seal and strong clamping action.

"O" ring seals the key effectively through a wide degree of key wear. This seal can be used on old angle cocks by properly reaming the bushing and inserting new key.



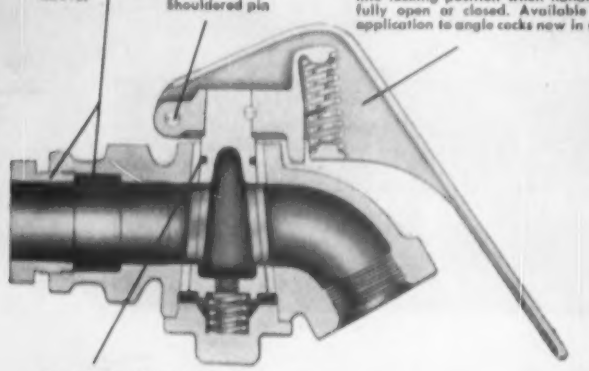
Brake pipe nipple length can fall anywhere within this range and still be perfectly sealed. Threaded nipple is not necessary but can be used if more convenient.

FOR PASSENGER CARS AND LOCOMOTIVES:

New Wabcoseal fitting is same as for freight car angle cock shown above.

Shouldered pin

Strong spring is compressed when handle is raised. Socket is snapped into locking position when handle is fully open or closed. Available for application to angle cocks now in use.



Sealed key is identical to freight car angle cock key shown above.

DON'T tolerate a high air leakage rate on your trains. Use the new Wabcoseal Angle Cocks for tighter seals.

The sealed key is new, with an "O" ring seal that stays tight through a wide range of key wear.

The brake pipe connection is new. A rugged Wabco compression ring replaces the old tapped thread. Tolerance for length of pipe nipple is now provided.

The spring-locking handle is new for passenger cars and locomotives. When the handle is removed to fully open or closed position a strong spring snaps the socket into locked position and keeps it there. A shouldered pin provides proper freedom of handle movement.

The sealed key and spring-locking handle are available for application to present angle cocks. See your Westinghouse Air Brake representative for more information.

Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION WILMERDING, PA.

PUBLISHED MONTHLY BY THE

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PUBLISHING CORPORATION

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FOREIGN REPRESENTATIVES.

Sibley-Fields Publishing Company, Ltd.
49 London Wall, London E.C. 2, England

Linder Presse Union GMBH
International Advertising Agency
(16) Frankfurt a.Main
Wittelsbacher Allee 60, West Germany

Railway Locomotives and Cars is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulation (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. Printed in U.S.A.

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

MARCH, 1955 **VOLUME 129, NO. 3**

Editorials 57

SPECIAL SECTION—The Frisco's Mechanical Department

Communications—A Mechanical Department "Must" 59
How Mechanical Department is Organized 60
General Car Department Policy 62
An Effective Hot Box Control Program 66
Car Inspection Aided by Novel Use of Radio 68
Rip Track Operations 70
Coach Needs Analyzed 72
The Car Man's Role in Damage Prevention 74
Training Its Men 75
Facilities and Operating Pools 77
General Diesel Policy 78
Novel Aid to Diesel Operation 83
Springfield Diesel Shop 84
Outlying Shops 88

Standard Journal Box in for a Change 91

Electrical Section

Santa Fe Girds to Service Reefers 94
Electrical Engineers Talk Traction 97
Power Supply for Railway Cars 100
From the Diesel Maintainer's Note Book 102
Eliminating Shaft Currents 104

Departments

Questions and Answers 106
Equipment . . . New Ideas—New Uses 10
News 6
Personal Mention 22
Supply Trade Notes 139
Index to Advertisers 160

Published monthly by the Simmons-Boardman Publishing Corporation at 1309 Noble St., Philadelphia, Pa. Entered as second-class matter, January 16, 1953, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. **Subscription Price** to railroad employees only in U.S., U.S. possessions and Canada, $2 one year, $3 two years, payable in advance and postage free. Subscription price to railroad employees elsewhere, $8 per year. Single copies, 50¢. Address correspondence concerning subscriptions to Robt. G. Lewis, Vice-Pres. and Dir. of Circulation, 30 Church St., New York 7.

Simmons-Boardman Publishing Corporation: James G. Lyne, President, New York; Samuel O. Dunn, Chairman Emeritus, Chicago; J. S. Crane, Vice-Pres. and Sec., New York; H. H. Melville, Vice-Pres., Cleveland; C. W. Merriken, Vice-Pres., New York; John R. Thompson, Vice-Pres., Chicago; Wm. H. Schmidt, Jr., Vice-Pres., New York; John S. Vreeland, Vice-Pres., New York; Fred W. Smith, Vice-Pres., Chicago; Robert G. Lewis, Vice-Pres., New York; Arthur J. McGinnis, Exec. Vice-Pres. and Treasurer, New York; Ralph E. Westerman, Asst. Treas., Chicago.

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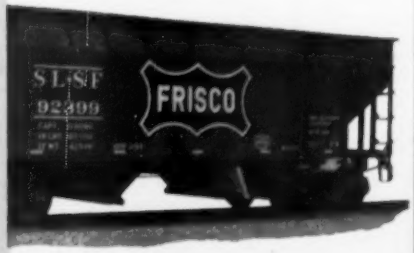
USS
HIGH STRENGTH STEELS
TWENTY-TWO YEARS OF PERFORMANCE

190,000 freight cars have been built

COR-TEN Steel construction pays for itself many times over

It costs about $187 more to build a 50-ton A.A.R. hopper car with body sheets of high strength, corrosion-resisting USS COR-TEN Steel of the same thickness as would be used in copper steel.

But this money is well spent—the use of COR-TEN Steel actually pays for itself many times over. First by saving the cost of one heavy repair and second by saving the time out of service such a repair involves.



USS HIGH STRENGTH STEEL

better with USS COR-TEN Steel since 1933

The FRISCO turns to USS COR-TEN Steel

to minimize freight car repair costs and to assure longer service life

THERE IS SOUND THINKING behind the use of USS COR-TEN by the St. Louis, San Francisco Railway Co.

The steadily rising cost of freight car repairs has in recent years focused attention on the economic value of construction that, by more effectively resisting damage and deterioration, will help to reduce such expenditures.

As a result, more and more railroads are adopting a *long range* point of view in their car building and rebuilding programs and are today using COR-TEN Steel construction which they know from experience will keep cars longer out of the repair shop.

Take hopper cars for example. During the normal (35 years) life of a car, body sheets of copper steel must be replaced *two* or *three* times. Under similar conditions and during the same service life, COR-TEN Steel hopper cars will require *only one* replacement of body sheets.

Railroads have estimated that the savings in repair cost thus accomplished are 5 to 6 times the extra first cost of COR-TEN Steel over copper steel. What's more, other substantial savings result from avoiding the time out of service for the additional shopping required by the copper steel car.

It is with these facts in mind that the FRISCO line has in the past five years used USS COR-TEN Steel construction in 800 new freight cars: in 200 70-ton gondolas built in 1950, and in 300 70-ton drop end gondolas and 300 55-ton hopper cars built in 1953 by Pullman Standard.

These hopper cars have been built with future costs firmly in mind. USS COR-TEN Steel is used in all sheets that contact the lading. Their dimensions are significant: $\frac{3}{8}$ in. thickness in hopper chutes and longitudinal hoods; $\frac{1}{4}$ in. side sheets; $\frac{5}{16}$ in. in floor and cross ridge sheets.

When you consider that these sheet thicknesses are equal or heavier than AAR standards and remember that USS COR-TEN Steel has 50% higher yield point than structural carbon steel, has 60% higher endurance limit and 4 to 6 times the resistance to atmospheric corrosion of plain carbon steel or 2 to 3 times that of copper steel, you will agree that longer life than usual and low repair costs can confidently be predicted for this FRISCO equipment.

See "THE UNITED STATES STEEL HOUR"—Televised alternate weeks—
Consult your newspaper for time and station.

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UNITED STATES STEEL

NEWS. . . . . .

Class I Roads Install 1,113 Locomotives in 1954

Class I railroads put 1,113 new locomotive units in service during 1954, compared with 2,110 in 1953, according to the Association of American Railroads. Installations last year included one steam locomotive, 15 gas turbine-electric locomotives and 1,097 diesel-electric units, while 1953 installations included 15 steam and four gas turbine-electric locomotives and 2,091 diesel-electric units.

On January 1, Class I roads had on order 483 diesel-electric units and 10 electric locomotives, compared with 546 diesel-electric units and 10 electric and 15 gas turbine-electric locomotives on order January 1, 1954.

Defects Increase Bureau of Safety Reports

The annual report of the Interstate Commerce Commission's Section of Railroad Safety, Bureau of Safety and Service, includes a recommendation that the penalty for violation of safety appliance acts be increased from $100 to $500.

The recommendation follows a report on the section's inspections of safety appliances and train brakes—investigations which showed increased percentages of defective equipment compared with the previous year. This showing, the report declares, "indicates a decrease in necessary inspection by railroads."

The report, submitted by C. W. Taylor, acting director of the bureau, advocates that "consideration should be given to recommending to Congress that the penalty for violation of safety appliance acts be increased. The present penalty of $100 for each violation was established more than 50 years ago. Taking into consideration the present-day value of the dollar, a comparable penalty would probably be $500 or more, and an increase of the penalty to that amount would no doubt cause many railroads to take more effective measures to comply with the law."

More prosecutions of safety violations also were reported, the total being 221 cases comprised of 713 counts for the year ended June 30, 1954. With 268 counts pending at the start of the year, the report states, judgment was confessed in 638 counts, four were dismissed and four, being tried, resulted in judgments for the government.

The commission itself, in its own an-

(Continued on page 22)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE FEBRUARY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horsepower	Service	Builder
Grand Trunk Western	7[1]	1,200	Road switchers	Electro-Motive
	2[1]	1,000	Switchers	American Locomotive

FREIGHT-CAR ORDERS

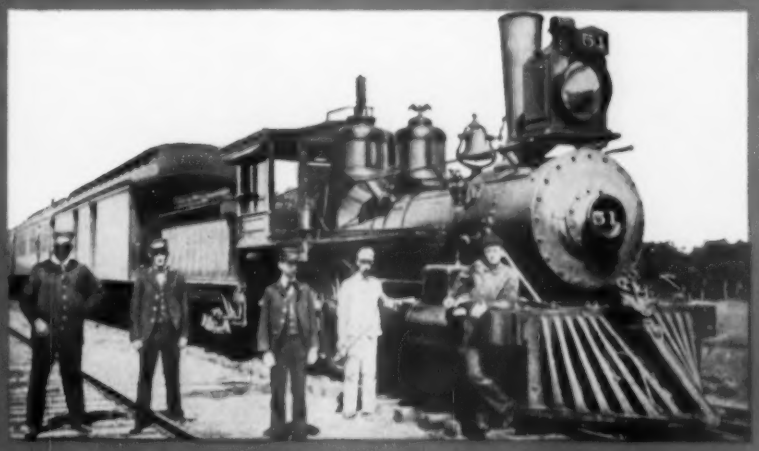
Road	No. of cars	Type of car	Builder
Alaska	100	70-ton hopper	Greenville Steel Car
Atchison, Topeka & Santa Fe	500	50-ton box	ACF Industries
	50	70-ton refrigerator	Company shops
Central of Georgia	1[2]	50-ton box	Pullman-Standard
Chicago & North Western	225[3]	50-ton box	Pullman-Standard
Chicago Great Western	15[4]	19,000 gal. tank	General American
	10[4]	70-ton covered hopper	Pullman-Standard
	10[4]	Caboose	International Ry. Car
Chicago Heights Terminal Transfer	100[5]	50-ton box	ACF Industries
Chicago, Milwaukee, St. Paul & Pacific	50	50-ton box	Pullman-Standard
Delaware & Hudson	100[6]	70-ton covered hopper	Pullman-Standard
Great Northern	25[7]	70-ton gondola	Company shops
Illinois Central	100[8]	70-ton covered hopper	Pullman-Standard
Kansas City Southern	90[9]	70-ton covered hopper	Pullman-Standard
Missouri Pacific	650[10]	Box	Company shops
	50	Flat	Company shops
Pennsylvania	300[11]	70-ton covered hopper	Company shops
Rutland	50[12]	50-ton box	Pullman-Standard
St. Louis Southwestern	400[13]	Box	Pullman-Standard
Seaboard Air Line	2[14]	125-ton flat	Company shops
Southern	1,150[15]	50-ton box	Pullman-Standard
Transportation Materiel Command	202[16]	10,000 gal. tank	ACF Industries
	46	50-ton box	Pullman-Standard
Fort Dodge, Des Moines & Southern	25[17]	Rack end	Chicago Freight Car Parts

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Chicago, Burlington & Quincy	10[18]	Gallery-type	Budd Co.
Seaboard Air Line	19[19]		Pullman-Standard
	6		Budd Co.

[1] Electro-Motive units for delivery about April 1; Alco units, delivered in January.
[2] Estimated cost, $6,088.
[3] For April delivery.
[4] Delivery of hopper cars expected this month. Estimated cost, $92,000. Delivery of caboose cars to begin in April and completed in June. Estimated cost, $159,000. Estimated cost of tank cars, $175,000.
[5] Estimated cost, $685,000. Delivery scheduled for April.
[6] Deliveries under way.
[7] Estimated cost, $215,000. Delivery scheduled for last quarter of this year.
[8] Estimated cost, $840,000. Delivery expected this month.
[9] Estimated unit cost, $7,600. Delivery expected within three months.
[10] 150 cars to be special "D-F" type.
[11] Delivery to be completed in late spring or early summer.
[12] Part of road's plan to budget its equipment purchases as announced in August 1954 issue, page 8, at the time it ordered 50 similar cars from the same builder.
[13] Estimated cost, $2,540,000. Deliveries expected to be completed this month.
[14] These depressed center flat cars, to cost about $32,000 each, are for special shipments, such as transformers and unusually heavy machinery. Each car will be 58 ft long with a depressed center section 21 ft long and 2 ft above the rails. The cars will have trucks with six 30-in. rolled-steel wheels. Trucks and cast-steel bodies will be manufactured by the General Steel Castings Corporation at Eddystone, Pa. Delivery expected in May.
[15] Approximate cost, $10,000,000. Cars to have Nailable Steel flooring. 200 to be equipped with roller bearings and cushion underframes. Deliveries expected to begin in second quarter of year.
[16] Tank-car unit cost, $6,400. Deliveries of tank cars to start in April and be completed in July.
[17] Delivery scheduled for fourth quarter of this year.
[18] Included in orders are cars with combinations of double bedrooms and tavern-lounges; double bedrooms, roomettes and sections; double bedrooms, compartments and drawing rooms; and 52-passenger reclining seat coaches. Among the planned innovations will be lounge roofs partially panelled in safety glass to permit overhead visibility, and smoking and reading lounges in the centers of the coaches. Deliveries scheduled for completion this year.
[19] For gypsum board loading. Car design to follow recommendations of gypsum wallboard manufacturers. End racks of all-welded construction, with a special metal enclosure at A end for adhesive materials which form part of most gypsum-board shipments. Compartment can be locked while in transit. Car decks flat and spacing of end racks such that minimum of blocking is needed. Special strap anchors positioned just inside side sill so lading may be tied with a near vertical pull to reduce side sway. Deliveries to begin late this month.

New York, New Haven & Hartford—The New Haven is likely to have "half a dozen" new high-speed, low-center-of-gravity passenger trains in operation between New York and Boston by mid-1956. John E. Slater, chairman of the road's board of directors, recently told the Downtown Luncheon Group of the Harvard Business School Club of New York. Trains of what he called an "improved Talgo" type, would, Mr. Slater believes, cut down New York-Boston running time from four hours or more to three hours or three hours fifteen minutes, thus shortening overall travel time from the center of one city to the center of the other by approximately one hour. This, he explained, would reduce, between city centers, the present time differential in favor of air travel, "where further appreciable time reduction is not likely"; and would retain, even after completion of contemplated new and faster express highways, the railroad's present time advantage over auto travel.



No. 51, a 4-4-0 built by Cooke in 1877, had a splendid record over the turn of the century as power plant for the famed Frisco "Meteor" on the St. Louis-Oklahoma City run. Note the fancy cab and other handsome adornments of this veteran.

Then...and now...serviced with Esso Railroad Products

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad products.

Diesel Fuels
ESSO ANDOK Lubricants—versatile greases
ARACAR—journal box oils
ARAPEN—brake cylinder lubricant
ESSO XP Compound—hypoid gear lubricant
DIOL RD—Diesel lube oil
CORLAX—traction motor gear lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hotbox Compound
AROX—pneumatic tool lube
CYLESSO—valve oil
ESSO Journal Box Compound
Asphalt
Cutting Oils
Rail Joint Compounds
Maintenance of Way Products
Signal Department Products
RUST-BAN—corrosion preventive

Esso

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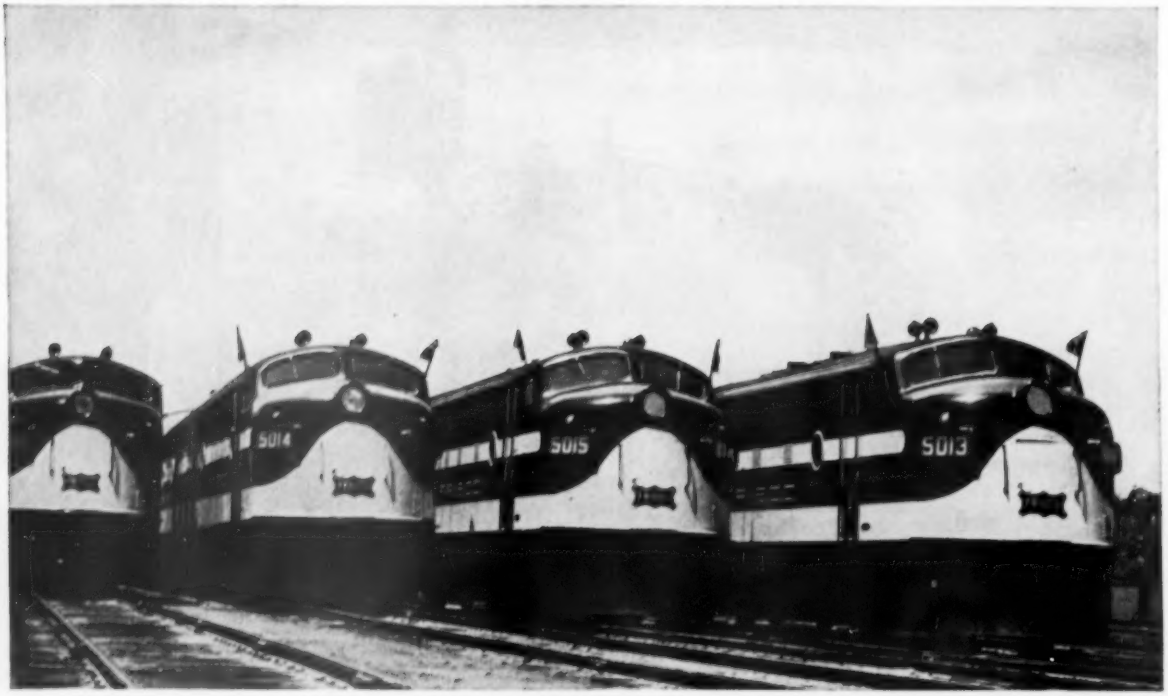
SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY — Boston, Mass. — Pelham, N. Y. — Elizabeth, N. J. — Bala-Cynwyd, Pa. — Baltimore, Md. — Richmond, Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.



DUCO and DULUX help the FRISCO keep appearances up...costs down

Frisco's road equipment, like this rugged-duty tie-tamper, benefits from DULUX protection, too. Dependable DULUX can take hard use and still keep its initial good-looking appearance for years!

For over a quarter century, the St. Louis-San Francisco Railway Company has used Du Pont Railroad Finishes. That's because the FRISCO, like so many other leading lines, has learned over the years that these finishes can be counted on to give outstanding performance. Their durability and lasting good appearance offer the solid eye appeal that builds public good will.

Attractive DUCO lacquer colors sparkle on the beautiful, big FRISCO diesels, while both DUCO and DULUX give beauty plus long years of service to passenger cars, stations, and road equipment.

There's a Du Pont Railroad Finish to meet any specific railroad need. They are chemically formulated to resist all kinds of weather and hard knocks...give rugged protection through years of service. So remember this slogan—*Business grows where DUCO and DULUX go.* E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Delaware.

85% *of America's leading railways use DUCO lacquer or DULUX enamel on passenger-train equipment*

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Railroad Finishes

CHEMICALLY ENGINEERED TO DO THE JOB BETTER

The Engineer's Report

CASE HISTORY
RPM Delo Oil R.R.
LUBRICANT

Western Pacific R.R. Co.,
FIRM

Special oil maintains high average mileage record!

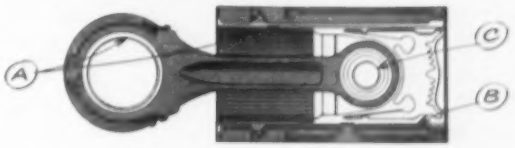
1776 CYLINDER ASSEMBLIES make up the 111 diesels in road freight service on the Western Pacific R.R. These units, as well as all passenger locomotives on the line, are lubricated with RPM DELO Oil R.R. Maintenance records of several years on freight locomotives show following average actual miles on parts removed for any reason: wristpins and bushings, 413,675 miles; pistons, 376,018 miles; liners, 354,101 miles. A representative assembly is shown in insert, just as it appeared after 476,497 actual freight miles. Note cleanliness of parts and free rings—typical of Western Pacific's experience with RPM DELO Oil R.R., the standard on the line since 1949.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARKS "RPM DELO" REG. U. S. PAT. OFF.

How RPM DELO Oil R.R. prevents wear, corrosion, oxidation

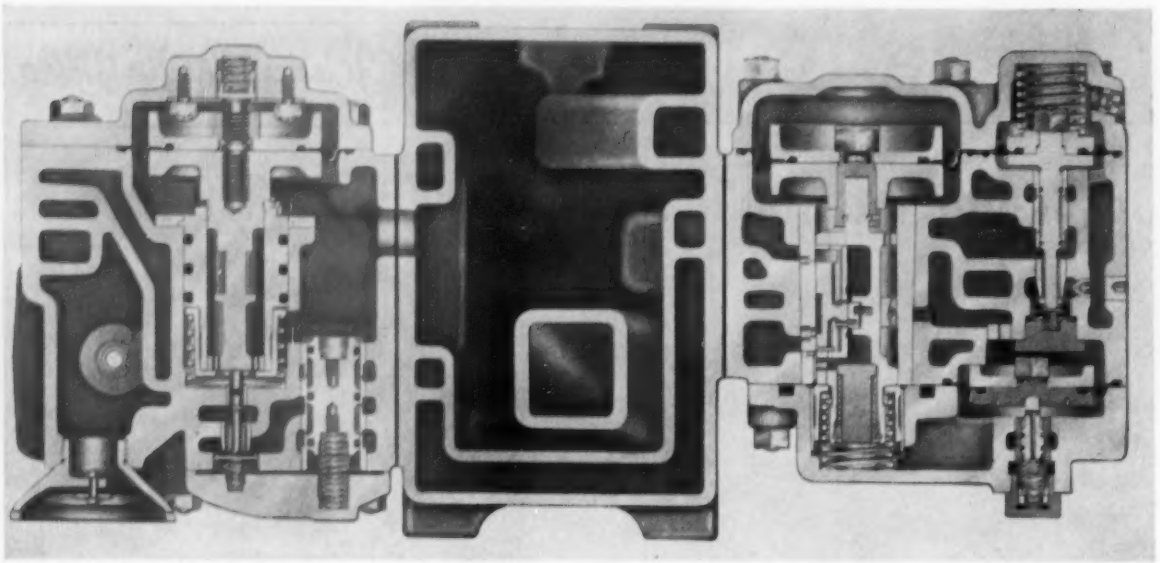


A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

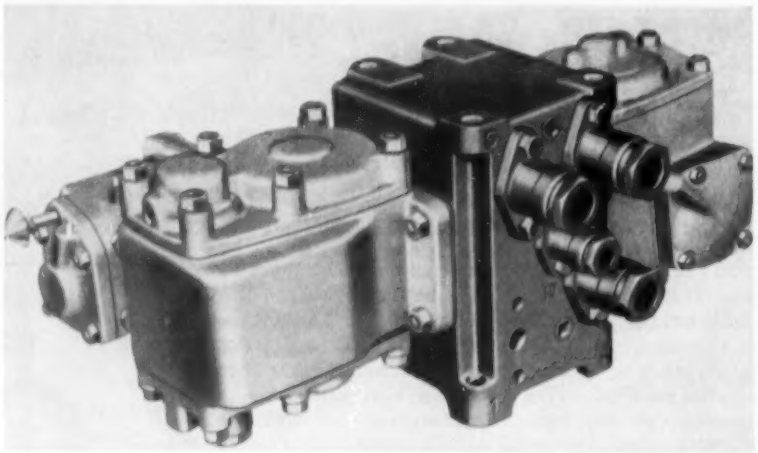
STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



Sectional view of the AC brake valve. At the left is the emergency portion, with the diaphragm piston, slide valve and bushing (center) and the accelerated release selector valve (right). At the right is the service portion, with the service diaphragm piston, slide valve and graduating valve (left), the limiting and inshot diaphragm piston valve (upper right), and the release insuring diaphragm piston and valve (lower right)

Low Maintenance, Accelerated Release Feature . . .

Westinghouse AC Freight Brake



Westinghouse AC freight brake valve. The reapplication valve, with the service portion at the left. The manual reapplication valve button is at the extreme left

An improved air-brake control valve for freight cars which operates in complete harmony with the present standard AB brake but with removable portions approximately 40 per cent lighter in weight has been developed by the Westinghouse Air Brake Company, Air Brake Division, and placed before the AAR for its consideration. The valve, designated AC, provides positive brake operation with extremely rapid serial release action, is simpler in design, and is less costly to maintain.

The main parts of the AC valve are made of aluminum. Ring-packed pistons are replaced by diaphragm pistons. Except at two locations, slide valves are replaced by spool valves, with rubber seal rings.

The AC brake valve performs essentially the same functions as those performed by the AB valve. The arrangement of the elements, however, has been changed and simplified. For instance, in the AB valve the in-shot piston and valve and the quick service limiting valve are separate features. These are combined in the AC valve, but a choke arrangement allows them to function at substantially the same cylinder pressure as in the AB.

The emergency section of the AB valve includes a piston, slide valve and graduating valve. In the AC valve the emergency diaphragm piston moves a small two-port slide valve and the remaining functions of the large slide valve in the AB equipment are performed by two spool valves packed with rubber seal rings.

In the AB valve the air strainer is in the pipe bracket portion. In the AC valve the brake pipe is connected directly to the vent valve in the emergency portion by a large passage, then through the strainer to other brake-pipe passages so that the air flow to the vent valve is unrestricted.

The three-stage build-up of emergency pressure, which is effected by the AB valve, has been changed to two stages in the AC valve. In the initial stage air from both auxiliary and emergency reservoirs flows to the brake cylinder by two routes. This accelerated build-up of brake-cylinder pressure is terminated when the inshot limiting function cuts off one route at 13 lb cylinder pressure. Thereafter, the build-up continues from both reservoirs through the brake-cylinder control choke at about the same rate as with the AB. The maximum cylinder pressure of 60 lb remains the same.

Another change which contributes to the rapid serial release of brakes after a service application is the dumping of emergency reservoir air into the brake-pipe side of the service diaphragm piston instead of into the auxiliary reservoir space

The service diaphragm piston slide valve and graduating valve

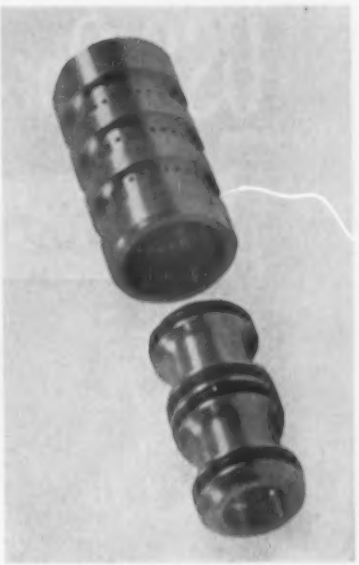
as is the case in the AB valve. This contributes to the rapid build-up of brake-pipe pressure in each car, inducing a rapid and positive movement of each service diaphragm piston and slide valve to full-release position. On a freight train of 150 cars brakes on cars at the rear end of the train begin to release 9 sec after those at the head end of the train. This compares with an interval of 50 sec on a train of the same length equipped with AB valves and requires a pressure wave traveling through the brake pipe at a speed approaching the velocity of sound. This permits release of a brake application at low speed instead of coming to a complete stop to avoid train damage, as is the present practice. The accelerated release feature does for the release function what quick service does for the application.

A new feature of the AC brake valve is the brake-cylinder release portion which combines two functions available in the AB valve and adds an important third

The release diaphragm piston and spool valve

function. This comprises a diaphragm-piston-operated release valve, a manually operated triplex release valve, and a manually operated reapplication valve. The triplex release valve, operated by a single handle, permits an overcharge to be released or both auxiliary and emergency reservoirs to be drained completely, or brake-cylinder pressure to be released without loss of reservoir pressure when breaking up trains. The selection between the functions is automatic, based on the presence or absence of brake-pipe pressure. By the use of the manually operated reapplication valve, in the absence of brake-pipe pressure, the brakes may be reapplied for piston travel readjustment. When brake-pipe pressure is restored following operation of the release valve, the AC valve resets automatically for proper train operation without reapplication of the brakes.

The use of diaphragm pistons instead of sliding pistons fitted with rings results in substantial maintenance savings. Piston regrooving, ring fitting and piston-chamber rebushing are completely eliminated. The diaphragms of synthetic rubber provide long piston travel and, being free from friction and leakage, are highly sensitive. The spool valves, packed with rubber "O" rings, and the bushings in



The high-pressure spool valve and bushing in the emergency portion of the valve

which they operate are subject to little wear. The relatively large emergency slide-valve bushing is ring packed and can be readily removed and replaced. The main diaphragm pistons operate vertically, which improves uniformity and stability. In addition to improvement in brake operation, these features should also permit longer intervals between required cleaning periods. Wherever controlled rates of air flow are required, replaceable chokes are employed. The size of these can be readily adapted to various sizes of brake cylinder.

The primary market for the AC valve will be for application on new freight cars. The manufacturer believes, however, that its potentially superior performance and lower cost of maintenance will make it attractive as a replacement for older AB valves as they require major overhauling. *Westinghouse Air Brake Company, Air Brake Division, Wilmerding, Pa.*

Higher-Strength Wire Rope

A new line of wire ropes, with steel cores, is said to have 15 per cent greater strength than the strongest grade marketed heretofore. Laboratory tests, as well as on-the-job observations over several years, have proved that the rope has higher resistance to wear from bending and abrasion. The rope, available primarily in preformed constructions, in sizes ranging from ¼ to 3½ in., was developed for use on shovels, draglines, wagon-scrapers, earth-moving equipment, hot-ladle cranes, etc., used in the oil, logging, mining, manufacturing and marine industries. *John A. Roebling's Sons Corporation, Trenton, N. J.*

Lightweight Magnet

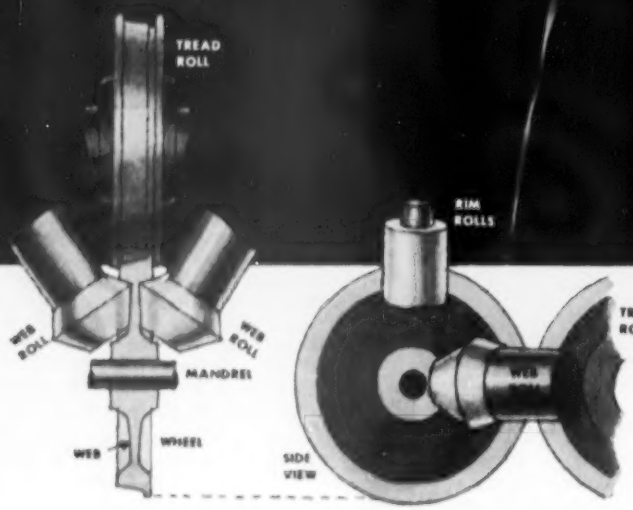
This magnet, designed for use with mobile or overhead gantry cranes, weighs only 3,400 lb as compared to approximately 3,750 lb for conventional designs. Lifting power is said to be approximately 10 per cent greater than other heavy-duty types.

It features Protecto-Weld construction wherein the outer ring and top plate are welded together on the top of the magnet. This places the weld in a position where it cannot be cracked or damaged by frequent blows. By eliminating danger of cracks, the device remains hermetically sealed against moisture indefinitely.

Lifting-coil repair or replacement is simple since the weld can be removed in a large lathe. Engineering data, such as voltages and lifting capacities for various grades of materials, are available from the manufacturer. *Ohio Electric Mfg. Co., Maple Heights, Cleveland.*

USS One-Wear Wrought Steel Wheels

start rolling here and keep rolling



AS THE WHEEL BLANK SPINS on the mandrel, two powered rolls are rotated against the web, forcing the metal out against the tread-forming roll which shapes the tread and flange. The rim rolls, rotating against the rim, form it to the correct width and thickness.

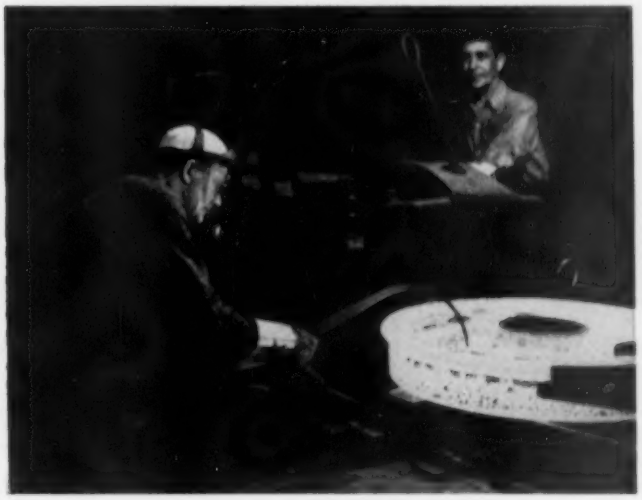
...for the FRISCO

safely for 200,000 miles or more

THIS is hot rolling—a critical step in the manufacture of USS One-Wear *Wrought* Steel Wheels.

The forged wheel blank, which has just been hub-punched and reheated, is brought from the furnace to the rolling mill by a charging machine. Giant tongs clamp onto the wheel and swing it into the rolls. As the hub lines up with the mandrel, the mandrel is shot into place. The driven rolls close on the wheel. The wheel begins to rotate. Suddenly, it's a whirling hot blur splashing pieces of hot scale through the air like a huge Fourth of July pinwheel. Perceptibly, the wheel increases in diameter as the rolls do their work. Then it slows and stops. Out goes the mandrel. The wheel, rolled to shape, is permanently identified by hot stamping—and is then on its way to the coning press, hub facing and rough boring machines, and final rigid inspection.

Controlled heating, forging, rolling and cooling produce uniformity in the structure of the steel and develop the desired hardness, ductility and strength —those qualities that make USS One-Wear *Wrought* Steel Wheels safer and more dependable than the ordinary wheel.



AFTER LEAVING the rolling mill each wheel is hot stamped with life long identification and its dimensions are checked against the required specifications with a set of king-size calipers.

USS ONE-WEAR *WROUGHT* STEEL WHEELS are your best investment because . . .

THEY LAST LONGER . . . USS One-Wear *Wrought* Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

THEY COST LESS . . . Their far greater life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel, even though, initially, the USS One-Wear *Wrought* Steel Wheel costs a little more than the ordinary type wheel.

REQUIRE LESS MAINTENANCE...Rolling on USS One-Wear *Wrought* Steel Wheels, a car spends more time in *service* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVE UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight *Wrought* Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which is directly converted either into additional payload capacity or into savings due to the decreased load. Furthermore, reduced unsprung weight means less damaging impact on the track system.

Two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

USS WROUGHT STEEL WHEELS

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

UNITED STATES STEEL

Frisco among first to reduce power failures through use of spliced endsills and endless V-Belt drives

Pioneering spirit of Engineering Dept. led to early acceptance of new under axle drive principle that improved power, reduced costs.

Over twenty years ago, F. G. Baker, Diesel Superintendent (now retired), St. Louis-San Francisco Railway, was seriously concerned with the common problem of generator power interruptions. These failures, depriving cars of air conditioning and light, were taking a heavy toll in costly downtime for battery recharging, maintenance and flat belt replacement. Mr. Baker took his problem to Dayton Rubber.

Out of the resulting investigations came the recommendation for a Dayton Endless V-Belt drive. Endless V-Belts were used because of their stronger gripping power, greater resistance to weather and absence of connectors.

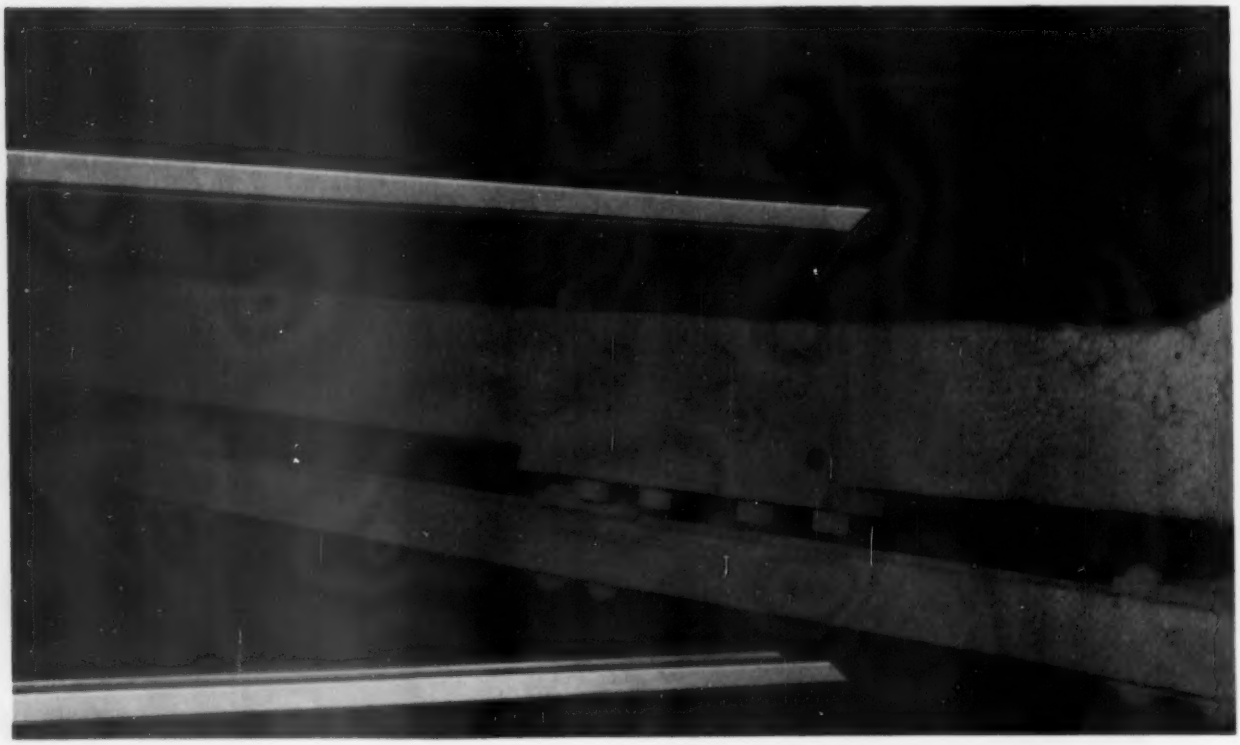
Together, engineers of Dayton Rubber Company and the St. Louis-San Francisco Railway Company worked out a spliced endsill that permitted use of Dayton *Endless* V-Belts on present equipment. Contrary to belief at that time, splicing proved to strengthen the endsill because of the reinforcing factor of the splice itself. Today, of course, Dayton's method of splicing has the approval of the foremost builders of railway trucks.

Dayton 1" BC-6 Endless V-Belts have now been made a component part and the results speak for themselves.

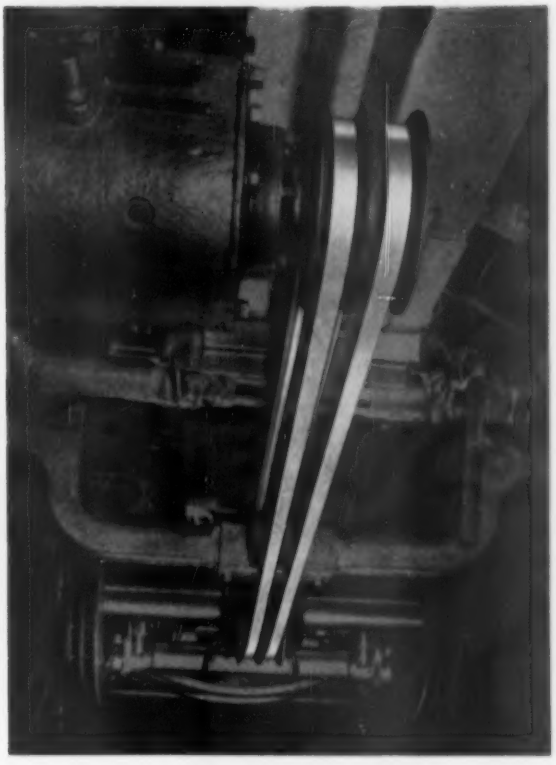
Where once 50,000 miles of uninterrupted generator service was considered excellent, Dayton Endless V-Belts were delivering 200,000 miles of continuous power. Where once drives were down for frequent belt replacement, Dayton Endless V-Belts which outlast 2 and 3 normal wheel turnings, are replaced when trucks are down for other repairs.

Since these early days, more than 17 major railroads have been using Dayton Endless V-Belts as standard equipment or have them on test pending approval as a component part.

Men of vision and foresight, like those in the engineering department of the Frisco railroad, who dedicate their lives to bettering equipment and service, are America's guarantee of ever-improving railroad transportation.



F. G. Baker, Frisco Diesel Superintendent (now retired) was an early pioneer in the use of Dayton Endless V-Belts. As early as 1934 Mr. Baker inaugurated use of the spliced endsills with these more dependable V-Belt drives.

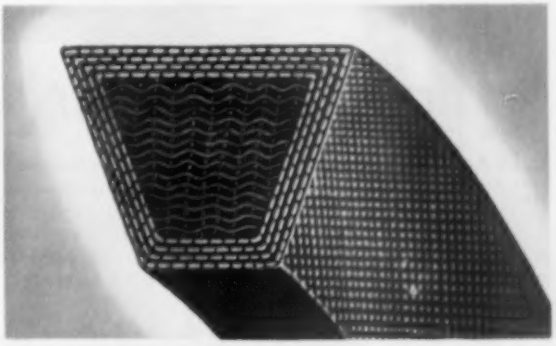


Splicing for Dayton Endless V-Belts has proved to be safe, economical, practical and efficient. In every case splice makes sill stronger.

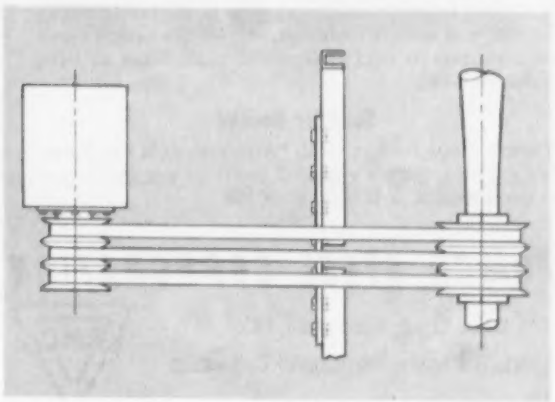
Dayton Endless V-Belt Axle Drives insure positive power.

More and more, railroad engineers are turning to Dayton Endless V-Belt drives to insure continuity of power and reduce operating costs. That's because Dayton Endless V-Belts, long a leader in the Railway field, have the built-in stamina to last and the traction quality to pull the load.

If your railroad is not receiving the many benefits to be gained from Dayton Endless V-Belt drives, it will pay you to contact your Dayton Field Engineer. He'll be glad to work with you from drawing board to yard installation and on the road. The solution to your problem may well be found through Dayton Rubber Co., Railway Div., Dept. 202, Dayton 1, Ohio.



The Dayton 1" BC-6 Endless V-Belt has provided 200,000 continuous service miles by test. Now used or on test by 17 railroads.



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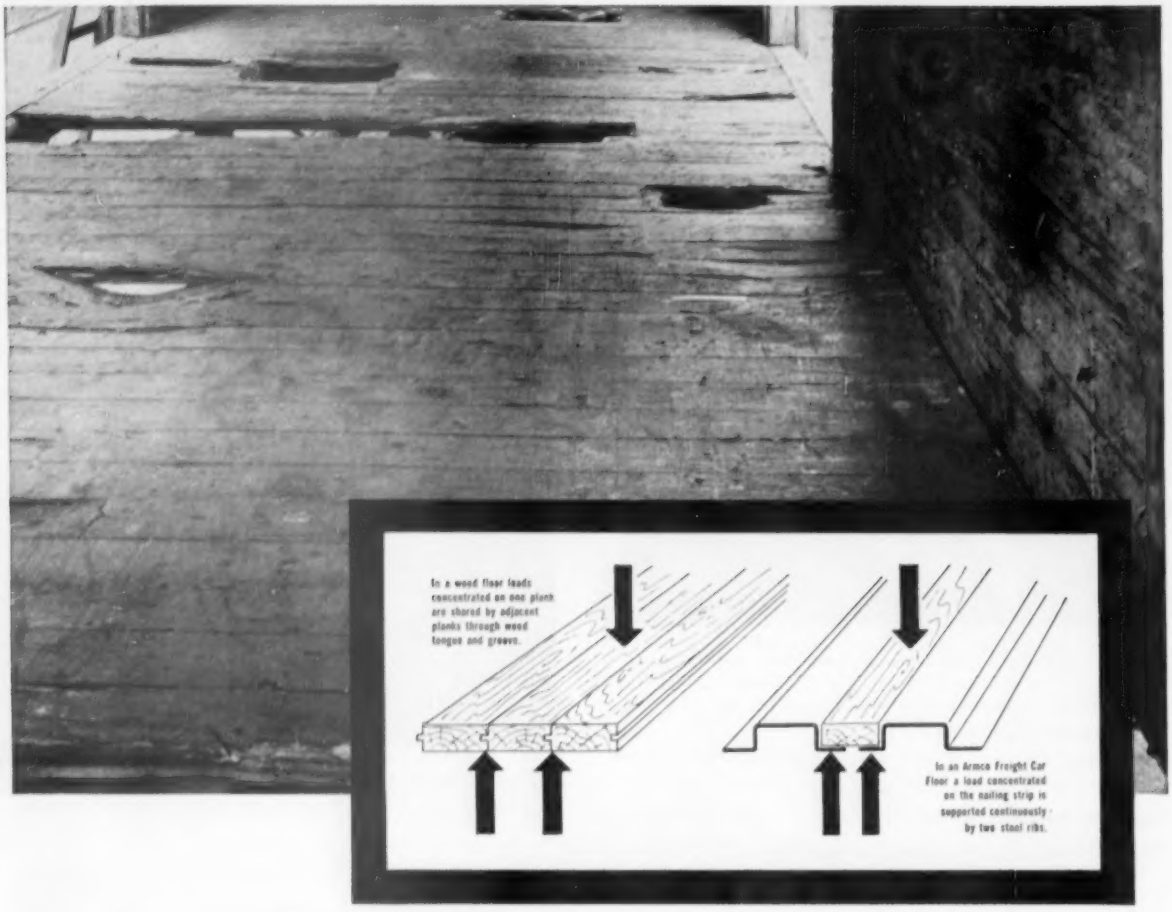
1905 · 1955

Dayton Rubber

50 YEARS OF PROGRESS

World's Largest Manufacturer of V-Belts

Specialized Railroad Representatives in New York, Chicago, Cleveland, St. Louis and San Francisco


In a wood floor loads concentrated on one plank are shared by adjacent planks through wood tongue and groove.
In an Armco Freight Car Floor a load concentrated on the nailing strip is supported continuously by two steel ribs.

Armco Car Flooring won't let this happen!

In Armco Freight Car Flooring, stout hat-section steel ribs take the load and support heavy wood nailing strips. That's why, even without extra stringer support, Armco Freight Car Flooring resists the heavy concentrated loads of lift trucks that often break through conventional car flooring. Besides, the ribs are welded to the car underframe and reinforce it.

For Gondola and Flat Cars, too

Armco Freight Car Flooring is made for gondola, box and flat cars. It is designed both for new construction and for replacement of worn-out wood or steel-plate floors in existing cars.

A Multi-Purpose Floor

The Armco floor will handle bulk- or unit-lading equally well. This eliminates the problem of selecting a car by floor type. It saves time and money for both the railroad and the shipper in switching empty cars. This is of special importance in the case of gondola cars. The same car that brings bulk loads into a plant can carry away the manufactured product.

Armco Freight Car Flooring is made for fastening bracing and skids in the proper way—with nails. There's no invitation to weld fasteners to plate floors or burn holes for bolts.

Send for Booklet

There's a new booklet about "Armco Freight Car Flooring." We'll send you a copy if you'll fill out the coupon below and mail it to us.

ARMCO STEEL CORPORATION
1804 Curtis Street • Middletown, Ohio

Send me a copy of the booklet, "Armco Freight Car Flooring."

Name_____

Position_____

Railroad_____

Street_____

City_____ Zone____ State_____

ARMCO STEEL CORPORATION

1804 Curtis Street, Middletown, Ohio

Export: The Armco International Corporation

ARMCO

THE GREATEST ADVANCE IN RAILROADING

...since the diesel locomotive!

A. A. R. APPROVED FOR

NMB Sealed

"Patented" and "Patents Pending"

Eliminates 81.4%* of all hot boxes

and 100% of hot boxes due to waste packing.

- **GREATLY REDUCES** operating costs, eliminates virtually all accidents due to hot boxes.
- **PROVIDES** a modern scientific system of lubrication and dirt exclusion for solid bearing journal boxes.
- **SIMPLE,** inexpensive installation. Requires no change in present journal boxes.

Over three years ago, NMB research engineers began the search for a solution to railroad car hot boxes. Our 33 years of sealing experience indicated an answer could be achieved by eliminating waste packing and sealing the solid bearing journal box so the journal and bearing could operate in a constant lubricant bath.

First came development of a shaft seal to retain lubricant and exclude water, dirt and brine from the rear of the journal box. To insure complete sealing and trouble-free operation, other parts were needed and were developed. These parts comprise the NMB Sealed Journal Box Kit. The Kit may be installed in any standard solid bearing journal box quickly, without alteration.

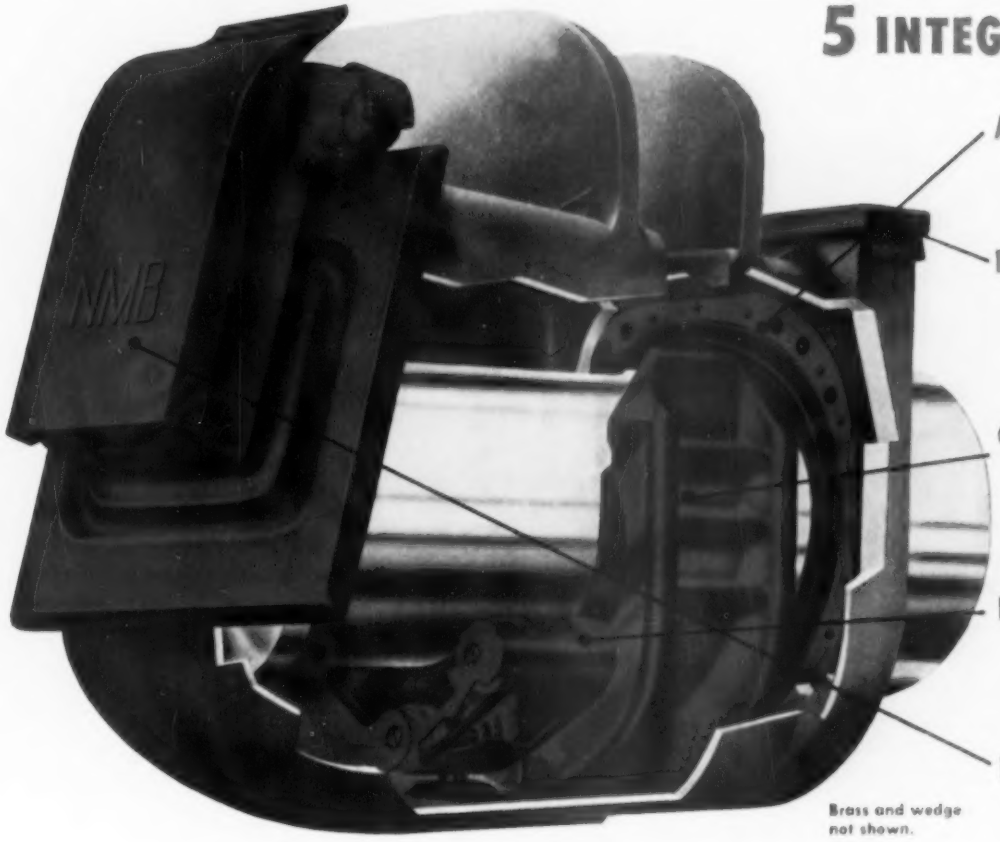
Performance has been truly remarkable. Experience shows the Kit can produce operating and maintenance savings of at least $6.88 per 1,000 car miles; an average of $116.96 per car per year.

NMB Kits have been tested continuously under all operating and weather conditions for the past three years. Initially, extensive tests were conducted on Union Pacific cars under supervision of Mr. David S. Neuhart, General Superintendent, Motive Power and Machinery, Union Pacific, and Chairman of the Mechanical Division, A.A.R., in collaboration with Mr. Lloyd A. Johnson, President of National Motor Bearing. Subsequently, tests were also conducted by the Southern Pacific under supervision of Mr. B. M. Brown, General Superintendent of Motive Power, and by the Western Pacific under supervision of Mr. E. T. Cuyler, Chief Mechanical Officer.

Today all three railroads have placed production orders for thousands of NMB Sealed Journal Box Kits. The railroads are installing Kits on box cars, piggy-back flats, and other cars where exceptional operating dependability is desired.

INTERCHANGE SERVICE ON 10,000 FREIGHT CARS

Journal Box Kit



Brass and wedge not shown.

5 INTEGRATED PARTS

A. OIL SEAL
Seals lubricant in, seals dust, dirt, water, brine and snow out.

B. DUST GUARD WELL COVER AND FILTER
Excludes dripping water, snow and brine, yet permits breathing of sealed box.

C. JOURNAL GUARD BEARINGS
Cushions journal box assembly against coupling, starting and braking shocks.

D. OIL CIRCULATOR
Constantly delivers large volume of oil to bearings; bearings and journal run 50° cooler.

E. JOURNAL BOX LID
Pressure-tight seal keeps oil in, dirt and water out.

Besides the NMB Kit for solid bearing freight cars, National has made thousands of oil seals for roller bearing railway cars, and over a billion oil seals for America's CARS • TRUCKS • TRACTORS • AIRCRAFT • MACHINES • APPLIANCES

NATIONAL MOTOR BEARING CO., INC.

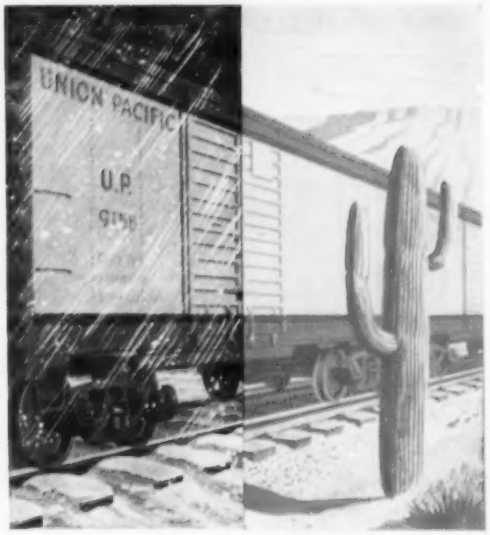
GENERAL OFFICES: Redwood City, California
PLANTS: Redwood City, Downey and Long Beach, California; Van Wert, Ohio

RAILWAY DIVISION DISTRICT OFFICE:
4113 Field Building, 135 S. La Salle Street, Chicago, Illinois

*Based on operating statistics of major Class I railroads.

READ MORE ABOUT KIT

NMB KIT proved in over 7,000,000 journal box miles

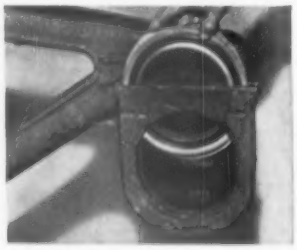


A. A. R. APPROVED FOR INTERCHANGE SERVICE ON 10,000 CARS

In Union Pacific, Southern Pacific and Western Pacific cars, the NMB Kit has now accumulated over 7,000,000 journal box miles under the most demanding operating conditions. **Operation is so dependable journal boxes equipped with the Kit are inspected only once each 30 days!** Railroad mechanical engineers and motive power superintendents say the following are some of the benefits railroads will realize from NMB Kits:

FAST, SIMPLE INSTALLATION without journal box alteration

1. Journal box is thoroughly cleaned. Locating washer for oil circulator is welded to bottom of box.



2. NMB Oil Seals are placed in dust guard well and side frame is pushed into position on the journals.

3. One guard bearing is inserted on each side of axle, with rubber bearing surface facing axle.

4. After mesh filter is placed in dust guard slot, dust slot cover is snapped into place.

5. Oil circulator is placed in position, and its pedestal installed through opening in locating washer.

6. Installation of NMB journal box lid is quick, simple, actually easier than conventional lids.

ELIMINATE MOST HOT BOXES An estimated 81.4%* of hot boxes are caused by waste packing, poor lubrication, or related causes. No waste packing is used in journal boxes equipped with NMB Kits. ALL HOT-BOXES CAUSED BY WASTE ARE ELIMINATED.

ELIMINATE REPACKING An annual saving averaging $17.10 per freight car per year.

90% LESS LUBRICATING OIL A major Western railroad spends $317,000.00 annually for journal box lubricating oil. Cars equipped with the NMB Kit use only 10% of normal oil requirement.

90% LESS INSPECTION A typical Class 1 railroad spends $2.70 per 1,000 car miles for oiler and inspector labor. Experience shows this cost can be cut to 27c with the NMB Kit.

LONGER JOURNAL AND BEARING LIFE A film lubricant is constantly maintained, and bearing end wear is practically nil.

ELIMINATE VIRTUALLY ALL ACCIDENTS CAUSED BY HOT BOXES!

An informative booklet on the NMB Kit, prepared specifically for mechanical and operating officials of American railroads, will be sent on request.

NATIONAL MOTOR BEARING CO., INC.

GENERAL OFFICES: Redwood City, California
PLANTS: Redwood City, Downey and Long Beach, California; Van Wert, Ohio
RAILWAY DIVISION DISTRICT OFFICE
4113 Field Building, 135 S. La Salle Street, Chicago, Illinois

3084

NATIONAL
OIL & GREASE SEALS
O-RINGS SHIMS

OVER A BILLION NATIONAL OIL SEALS supplied for America's automobiles, trucks, tractors, plus millions more for machinery of all types, railway roller bearing journal boxes, aircraft and household appliances.

Time

. . . rides on your side with

Streamlite HAIRINSUL

LOW CONDUCTIVITY . . . Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity —.25 btu per square foot, per hour, per degree F., per inch thick.

LIGHT WEIGHT . . . Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.

PERMANENT . . . Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.

EASY TO INSTALL . . . Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.

COMPLETE RANGE . . . STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings available.

HIGH SALVAGE VALUE . . . The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.

. . . because time has yet to destroy or impair the high insulating efficiency of *Streamlite* HAIRINSUL

Even after twenty or more years of service, STREAMLITE HAIRINSUL has been removed from refrigerator cars and re-used in new cars without need for further processing or renovating.

STREAMLITE HAIRINSUL, the all-hair insulation that actually weighs 40% less and gives so much more in efficiency and economy is a one-time investment.

At right are still more reasons why leading car builders demand STREAMLITE HAIRINSUL for efficient insulations. Write for complete data.

MERCHANDISE MART, CHICAGO 54

SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of November 1954	Month of November 1953	11 months ended with November 1954	11 months ended with November 1953
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	5,463	10,040	67,980	134,206
3-06	Total, Diesel-electric	33,284	31,328	357,117	343,881
3-07	Total, electric	652	670	7,136	7,974
3-04	Total, locomotive-miles	39,622	42,118	433,905	486,819
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,532	1,558	16,623	18,317
4-06	Empty, total	899	942	9,691	10,119
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	11,817	18,567	137,671	244,242
6-02	Total in oil-burning steam locomotive trains	1,842	4,649	24,812	64,875
6-03	Total in Diesel-electric locomotive trains	92,434	86,153	988,245	961,339
6-04	Total in electric locomotive trains	1,998	1,930	21,919	22,700
6-06	Total in all trains	108,844	111,561	1,178,306	1,295,668
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10-02	Loaded freight car-miles	41.40	39.90	41.00	40.80
10-03	Empty freight car miles	24.30	24.10	23.90	22.50
10-04	Total freight car-miles (excluding caboose)	65.70	64.00	64.90	63.30
10-05	Gross ton-miles (excluding locomotive and tender)	2,941	2,855	2,908	2,884
10-06	Net ton-miles	1,311	1,274	1,290	1,311
12	Net ton-miles per loaded car mile (M-211)	31.70	31.90	31.40	32.20
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	63.00	62.30	63.20	64.40
14	Averages per train hour (M-211):				
14-01	Train miles	18.70	18.60	18.70	18.20
14-02	Gross ton-miles (excluding locomotive and tender)	54,322	52,499	53,887	51,827
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	44.40	44.70	42.70	45.80
14-02	All	41.60	42.60	40.30	43.60
15	Average net ton-miles per freight car-day (M-240)	830	847	799	903
17	Per cent of home cars of total freight cars on the line (M-240)	50.90	48.90	53.00	46.30

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	1,699	2,864	24,543	45,285
3-06	Diesel-electric	20,192	20,064	229,088	221,885
3-07	Electric	1,326	1,428	15,182	16,707
3-04	Total	23,218	24,357	268,816	283,877
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	232,231	243,684	2,697,473	2,864,315
4-09	Total in coal-burning steam locomotive trains	8,171	14,707	120,273	250,711
4-10	Total in oil-burning steam locomotive trains	6,019	10,238	91,914	157,658
4-11	Total in Diesel-electric locomotive trains	203,212	202,727	2,317,145	2,270,366
12	Total car-miles per train-miles	9.62	9.63	9.66	9.76

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	268	481	3,364	6,461
1-02	Steam, oil-burning	52	70	597	1,138
1-03	Diesel-electric[1]	3,355	3,384	36,169	37,888
1-06	Total	3,683	3,953	40,225	45,703
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	10	16	129	218
2-02	Steam, oil-burning	5	4	57	70
2-03	Diesel-electric[1]	246	252	2,787	2,813
2-06	Total	287	303	3,256	3,451
3	Hours per yard locomotive-day:				
3-01	Steam	4.90	6.20	4.80	6.80
3-02	Diesel-electric	15.20	15.80	15.00	16.20
3-05	Serviceable	14.90	14.60	14.40	14.90
3-06	All locomotives (serviceable, unserviceable and stored)	12.80	13.00	12.40	13.20
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.68	1.76	1.68	1.73
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.76	.77	.75	.76

[1]Excludes B and trailing A units.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes: System	Foreign	Total	Miles car set off
November, 1951	2,939,503	2,022	4,405	6,427	457,368
November, 1952	2,984,101	2,198	4,501	6,699	445,455
1953					
January	2,828,906	2,219	4,123	6,342	446,059
February	2,625,563	2,111	4,059	6,170	425,537
March	2,904,227	2,696	6,077	8,769	331,192
April	2,850,752	3,383	6,435	9,818	290,359
May	3,013,610	5,892	11,433	17,325	173,945
June	2,926,001	8,537	15,296	23,833	122,771
July	2,925,317	9,342	15,775	25,117	116,467
August	2,971,020	8,638	14,160	22,798	130,319
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,415,214	2,953	4,066	7,019	348,370
March	2,658,757	2,196	3,637	5,833	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232

(Continued from Page 6)

nual report to congress, made no recommendation such as suggested by Mr. Taylor.

The safety section reported that its inspections revealed 50.85 safety defects for each 1,000 locomotives and cars inspected, as contrasted with 43.21 per 1,000 in 1953. The number of locomotives and cars inspected was 1,405,793, with 4.34% defective. A total of 1,347,710 freight cars, 42,342 passenger-train cars, and 15,741 locomotives were inspected, as against 1,253,590 freight cars, 38,115 passenger-train cars and 14,303 locomotives in the previous fiscal year.

More Defects—The total percentage of defective freight cars last year was 4.38 compared with 3.68 in 1953; of the passenger train cars and locomotives inspected last year 3.69% and 2.26% were defective, respectively, as against corresponding figures of 3.41% and 1.97% for 1953.

In the section's inspections of train brakes, the report states, 2,978 trains consisting of 138,302 cars were tested prior to departure from terminals and 99% of the cars were found operative. Tests were made on 1,684 trains arriving at terminals with 98.2% of the 98,005 cars tested found to be operative.

However, the report continues, "to procure the percentage of operative brakes (on departing trains) . . . 3,557 cars having defective brakes were set out and brakes were repaired on 4,865 cars remaining in trains. These trains had been prepared for departure, yet when . . . tested by our inspectors . . . an average of 2.8 cars per train" had to be set out or repaired.

PERSONAL MENTION

Atchinson, Topeka & Santa Fe

CREED R. BRUNELLE, assistant supervisor air brakes, Eastern District of Eastern lines at Shopton, Iowa, has retired.

J. G. HYNES, assistant supervisor of air brakes at Albuquerque, N. M., transferred to Shopton, Iowa, to succeed Mr. Brunelle.

CURT LAWHON, road foreman of engines, Eastern Division, at Argentine, Kan., appointed assistant supervisor of air brakes at Albuquerque, N. M.

PALMER A. QUARLES, assistant supervisor of air brakes, transferred from Newton, Kan., to Amarillo, Tex.

W. D. CURTIS appointed assistant supervisor of air barkes at Newton, Kan.

Atlantic Coast Line

R. M. VANN appointed diesel foreman at Jacksonville, Fla.

W. B. BENNETT appointed road foreman of engines at Waycross, Ga.

H. W. LOW, appointed road foreman of engines at Manchester, Ga.

C. D. Allen

F. E. Molloy

H. A. Hudson

F. E. Russell

Canadian National

COLIN T. CAMERON, superintendent of the car shop at Transcona, appointed assistant general superintendent, car equipment, Western region, with headquarters in Winnipeg, Man.

P. L. MATHEWSON, chief of research, appointed assistant chief of motive power and car equipment, system.

WILLIAM P. MOFFAT appointed chief of research.

Chesapeake & Ohio

C. D. ALLEN, superintendent motive power, Southern Region, at Richmond, Va., has had jurisdiction extended to include entire system. The picture of C. D. Allen that appeared on page 24 of the February issue was not that of Mr. Allen of the C&O; his picture appears above.

New York Central

GEORGE M. SCHMIDBAUER appointed assistant superintendent shop—car at Beech Grove, Ind.

J. W. STECK, superintendent of shops at Avis, Pa., has retired.

T. C. SMITH, steel shop foreman at Avis, Pa., has been placed in charge of the Avis shops.

Norfolk & Western

Headquarters, Williamson, W. Va.

C. E. IRESON, electrical foreman, has retired.

C. F. CORMELL, assistant electrical foreman at Portsmouth, Ohio, appointed electrical foreman at Williamson.

G. A. MINNIX, electrical inspector in office of general superintendent motive power, appointed assistant electrical foreman.

R. W. SMILEY, assistant road foreman of engines, Radford division, has retired.

C. B. CONNER, assistant road foreman of engines, Shenandoah division, transferred to Radford division as assistant road foreman of engines.

Southern

CAREY H. BRAZELLE appointed night foreman at Greenville, S. C.

GLEN GOLDSTON appointed road foreman of engines at Birmingham, Ala.

HALBERT A. HUDSON, signal and electrical superintendent at Cincinnati, appointed assistant to vice-president, with jurisdiction over signal and electrical affairs, at Washington, D. C.

LEONARD C. BROWN, assistant engineer, signal and electrical department, at Washington, D. C., appointed signal and electrical superintendent at Cincinnati.

Southern Pacific

FRANK E. MOLLOY appointed superintendent motive power and equipment at Sacramento, Cal., as announced in the February issue. *Born:* Creaston, Iowa, November 19,1898. *Education:* High school (nights); I.C.S. air-brake equipment courses; LaSalle courses in business management. *Career:* From 1913 to 1925, call boy, machinist apprentice, and special apprentice (air brake) on Chicago, Milwaukee, St. Paul Pacific; machinist on Great Northern; machinist and relief roundhouse foreman on Milwaukee. Subsequent career with SP, consecutively, as machinist, air-brake supervisor, roundhouse foreman, and master mechanic. Appointed assistant superintendent motive power in 1944; superintendent motive power (temporary) in 1951, and assistant superintendent motive power in 1952.

WILLIAM O. BROWN, master mechanic, Portland Division, appointed assistant superintendent motive power at Sacramento, Cal.

F. R. OLDS, assistant master mechanic, Portland Division, appointed master mechanic, Portland Division.

E. F. PETERS, general foreman at Eugene, Ore., appointed assistant master mechanic, Portland Division.

HERBERT G. VANCE, superintendent of shops at Sacramento, has retired.

GLEN M. CAGLEY, master mechanic, Salt Lake Division, appointed superintendent of shops at Sacramento, Cal.

ROY D. YOUNG, master car repairer, Sacramento Division, has retired.

JOHN C. STOCKTON, master car repairer, Portland Division, appointed master car repairer, Sacramento Division.

FRANCIS W. THOMPSON, appointed master car repairer, Portland Division. Mr. Thompson formerly master car repairer, Northwestern Pacific at Tiburon, Cal.

ALLEN E. SIMKINS, district car inspector at Sacramento general shops, appointed assistant master car repairer, Western Division.

Texas & New Orleans Lines

FRANK E. RUSSELL, appointed superintendent of motive power and equipment at Houston, Tex., as announced in the February issue. *Born:* Alameda, Cal., September 18, 1905. Education: University of California (B. S. in M. E. 1928). *Career:* Began in 1928 as a special apprentice on the S. P. at Sacramento, Cal., and Roseville. Subsequently was night roundhouse foreman at Crescent Lake, Ore., shop foreman at Eugene, Ore; shop foreman at Roseville; assistant master mechanic; master mechanic at El Paso, Tex., and assistant superintendent motive power at Los Angeles, until 1942. After his four year's service in the Army of the United States during World War II, with the rank of colonel, he returned to the SP on March 1, 1946, as superintendent motive power at Sacramento. During the year April 1951-52 he was on leave, serving as chief of roadway, Equipment and Manpower Branch, Railroad Transport Division, D. T. A. Washington, and vice-chairman, O. D. M. Transportation Committee for Scrap Recovery.

Western Pacific

E. T. CUYLER, has been appointed chief mechanical officer at Sacramento, Cal., as announced in the December issue. Education: Iowa University (engineering). Career: Began as a special apprentice on the Chicago, Rock Island & Pacific. Was serv-

(Continued on page 139)

You're looking at some of the nickel silver hardware for Canadian Pacific Railway's new streamliners. It was produced by the Robert Mitchell Company, Ltd., in their factory and foundry at St. Laurent, P.Q., Canada.

From door handles to ashtrays... this railroad buys Nickel Silver Hardware for Beauty and Utility at Low Cost

A representative of Canadian Pacific Railway's purchasing department is shown above, tabulating nickel silver hardware data.

Hinges, door handles, ashtrays and other decorative hardware for the new streamlined stainless steel cars are of nickel silver containing a minimum of 19% nickel, to assure enduring whiteness.

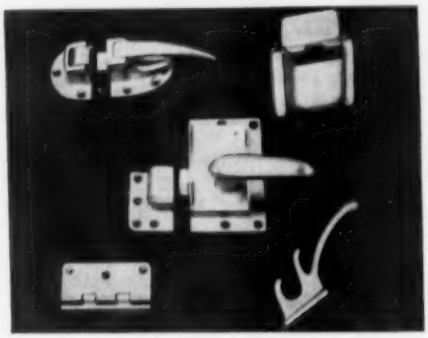
This alloy combines ornamental lustre with ability to resist corrosion and damage from wear, abrasion or scuffing. In fact, you'll find that nickel silver hardware and trim give a refined beauty to passenger car luxury throughout the life of the car. And they also minimize maintenance labor and expense the year 'round.

Moreover, nickel silver is much more easily cast than other white metals that compete with it for applications involving appearance, strength and durability.

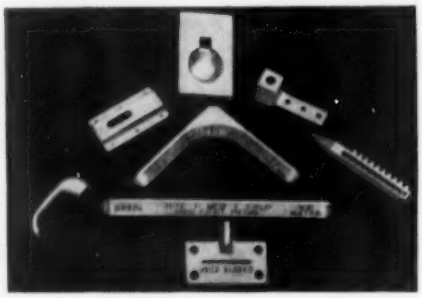
Silvery white all the way through, nickel silver answers the railroad operator's demand for impressive beauty and durability with ultimate economy.

We shall be glad to give you additional information about versatile nickel silver and help you select the alloy best suited to your requirements. Write us today for your free copy of the booklet, "Nickel Silver Castings."

INCO
TRADE MARK



Railroad car fixtures produced in nickel silver by Loeffelholz Co., Milwaukee, Wisc., for long lasting beauty and corrosion-resistance.



Sleeping car hardware cast in nickel silver by Universal Castings Corp., Chicago, Ill. These items show the adaptability of this alloy to parts that are useful as well as ornamental.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

SIOUX

Salutes The

FRISCO

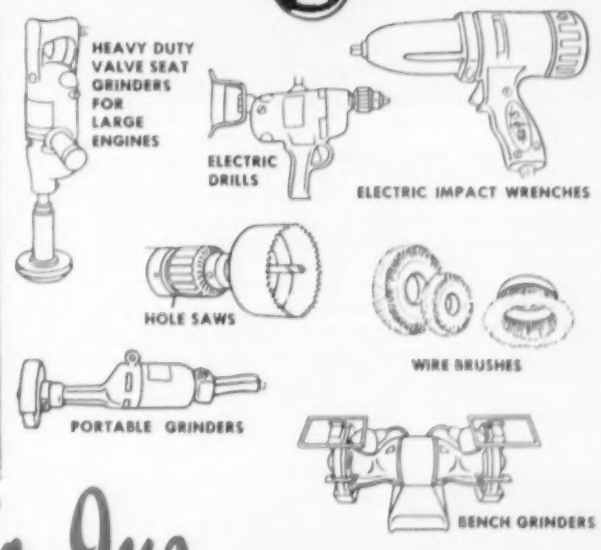
Outstanding efficiency has earned the FRISCO's Mechanical Department numerous distinctions. Albertson & Company, Inc., is proud of the part SIOUX equipment has played.

A SIOUX No. 682 Valve Grinding Machine is shown grinding valves in head reclamation operations for Alco and E-MD locomotives. This picture was taken in the FRISCO Diesel Shop at Springfield, Missouri.

When it comes to these big jobs, there's just nothing like the SIOUX No. 682 Valve Grinding Machine for precision, speed and dependability.

Sioux Tools

STANDARD THE WORLD OVER



Albertson & Co., Inc. SIOUX CITY, IOWA, U.S.A.

EQUIPMENT

(Continued from page 11)

Corrosion-Resistant Wrought Iron Tubing

For installation in heat transfer and air-conditioning apparatus, corrosion-resistant wrought-iron tubing is now being manufactured to precise tolerances. According to the maker, specific services in which the tubing's resistance to corrosion and fatigue failure help to reduce the frequency of repair or replacement include: ammonia condensers, heat exchangers, pre-heaters, gas cooling apparatus, gasoline condensers, evaporators, cooling pipe and steam condensers. It is especially suitable for handling salt and brine solutions in air-conditioning systems.

The cold drawn tubing is comprised of high purity iron and iron silicate in physical rather than chemical association. This combination gives the metal a strong structure and the slag fibres, numbering some 250,000 per sq in., disperse the attack of corrosion forces and prolong life of tubing.

Physical properties of the tubing conform to those listed for welded wrought iron pipe in ASTM Specification A-72. The product is presently available in sizes ranging from ⅜ in. to 3-½ in. in outer diameter and in 14 to 8 gage thickness. It is supplied in lengths according to desires of the customer. *A. M. Byers Company, Pittsburgh.*

C-D-F TAPES of TEFLON*

- Heat Resistant—up to 500° F.
- High Dielectric Strength
- Strong, tough, durable

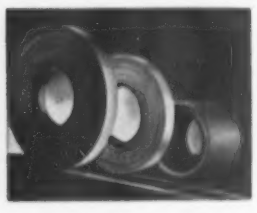
It is no longer necessary to spend time, effort and materials in frequent re-wrapping of field coila. Use C-D-F TEFLON tapes for the job—they have unusually long service life. Tapes are easy to apply, easy to handle. Rolls are supplied in a wide range of widths and thicknesses either in 100% TEFLON film or TEFLON glass fabric supported.

TEFLON has high heat resistance—withstands 260° C. (or 500° F.) without appreciably affecting its physical or electrical properties. It meets Class H AIEE standards for maximum hot spot insulation temperature of 180° C. TEFLON has practically zero water absorption and its electrical properties are little affected after long exposure to high humidity. Its dissipation factor and dielectric constant are extremely low and unchanged over a wide range of frequencies.

TEFLON has a wide range of applications in the railroad industry. For wire and cable coverings where the electrical properties must not suffer impairment even under extreme temperature and humidity conditions, TEFLON is the ideal material. TEFLON may be applied in single or multiple wrapping operations which may include a TEFLON glass fabric cloth supported tape on the outside for resistance to abrasion. TEFLON wrapped cables find extensive use in Diesel locomotive wiring where abrasion of exposed wiring, due to undercar blast, is an important factor.

If you are not now using C-D-F TEFLON tapes and want to know more about TEFLON, the most promising of new plastics, write for Folder T-52 with samples. For technical assistance call your C-D-F sales engineer (offices in principal cities). He's a good man to know.

*du Pont Trade Mark



CDF

Continental-Diamond Fibre

CONTINENTAL-DIAMOND FIBRE COMPANY

NEWARK 104, DELAWARE

A C Welder

This heavy duty welder, Model SLP, for a wide range of a c welding production jobs is available in 300, 400 and 500 amp sizes. Its transformer is of shell type design using the saturable leakage path control system for adjustment of welding current. A secondary winding supplies current to the selenium type control rectifier for low-voltage remote control. No high voltage appears across any control coils, eliminating possibility of insulation breakdown or high voltage appearing under the rheostat handle.

The device has no moving parts; the core and coils are anchored in place. It is capacitor equipped for power factor correction. Three wheeled portable mounting is optional equipment. *Hobart Brothers Co., Hobart Square, Troy, Ohio.*

Rectifier-Type Welder

Now in production, this 300-amp rectifier-type welder offers full time arc force control for holding very short arcs with deep penetration. It features quiet operation and low maintenance cost.

Provided with a current range of 20 to 375 amp, the welder utilizes the moving primary coil design, obtaining current adjustments by separation of primary and secondary coils. Windings are of aluminum

(Continued on page 143)

This is COPPER PENETRATION

a leading cause of AXLE FAILURE

The irregular, sharply defined lines you see on this axle journal are fluorescent indications of copper penetration. Glowing under black light, they reveal that this axle is unsafe for service!

This is a photomicrograph of a part of the section cut from the axle where MAGNAGLO showed copper penetration (arrow). Enlarged more than 400 times, it clearly shows how copper has penetrated the grain structure of the steel, weakening it to the point of probable failure.

MAGNAGLO*—

and Only **MAGNAGLO—**

Detects and Marks It

Every Time!

Careful, prolonged studies by leading railroads indicate that whenever a journal overheats to the flow point of copper, penetration by *copper and other bearing metals* is likely to occur. This is invisible on the journal surface.

Safety demands that such axles be inspected. While other means are sometimes used, MAGNAGLO is the *only reliable test* to detect penetration by copper and all other metals—even at the earliest stages. Considering the safety it assures, its cost is very little. *It should be a requirement for all suspect axles!*

If you would like further data on this very important and timely subject, please write us.

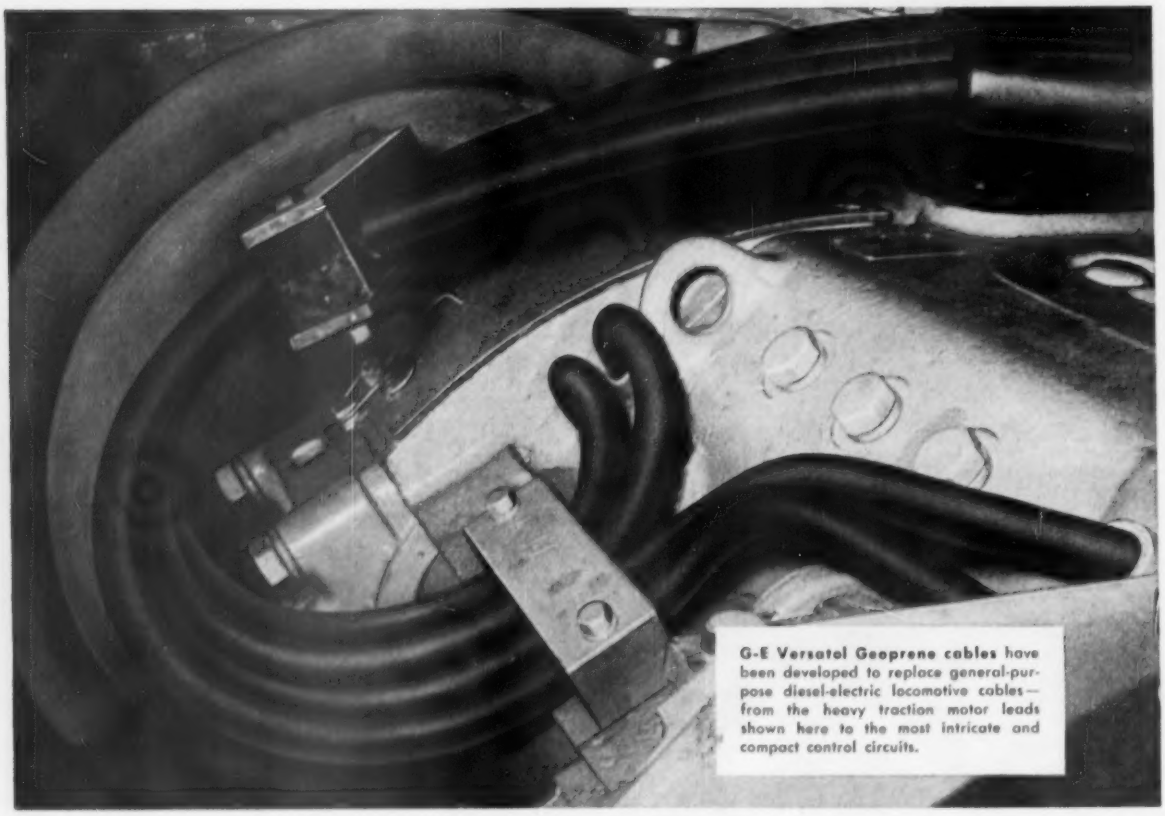
*T. M. Registered U. S. Patent Office

MAGNAFLUX CORPORATION

7320 West Lawrence Ave., Chicago 31, Illinois

New York 36 • Pittsburgh 36 • Cleveland 15

Detroit 11 • Dallas 19 • Los Angeles 58



G-E Versatol Geoprene cables have been developed to replace general-purpose diesel-electric locomotive cables—from the heavy traction motor leads shown here to the most intricate and compact control circuits.

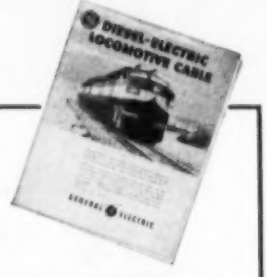
Replace Diesel-electric Locomotive Wiring with G-E Versatol Geoprene Cable—Size for Size

Now a single type of cable, G-E Versatol* Geoprene*can be used to replace the many types of general purpose cables used as original equipment on all diesel-electric locomotives. Versatol Geoprene, a rugged cable that has been tested for diesel-electric service under the most severe operating conditions, can be used to rewire power and control circuits—in the same sizes as the original wiring.

G-E Versatol Geoprene makes terminal attachment easy, because the copper stranding is always concentric and always of the correct diameter. This cable resists water, oils, live steam, ice, and cleaning compounds. It is extremely flexible and easy to pull through conduit. The insulation strips cleanly and easily.

This cable can help you simplify your inventory problem because you need to carry only one type in stock. G-E Versatol Geoprene is available in size No. 14 Awg and larger with a 1000-volt rating for power circuits, and No. 16 and No. 14 Awg with a 300-volt rating for control circuits. Special cables are available for installations in high-temperature areas.

*Registered Trade-mark General Electric Company



For more information write for the specification folder "G-E Diesel-electric Locomotive Cable", Section W130-347, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Progress Is Our Most Important Product

GENERAL ELECTRIC

HYATTS KEEP OVERHEAD DOWN!

that's why you'll find Hyatt Roller Bearings on:

7 OUT OF 10 DIESEL ROAD LOCOMOTIVES

Don't compare *purchase cost alone* when you're comparing roller bearing journal boxes. Compare *installation, maintenance* and *inspection costs,* too—that's where the *big difference* is!

4 OUT OF 10 MODERN PASSENGER CARS

Hyatts are *easiest to install—easiest to inspect—easiest to maintain*—because Hyatt design is less complicated, more rugged. Only Hyatts give you these *long-haul savings*!

OVER 16,000 FREIGHT CAR JOURNALS

Hyatt's "free lateral" feature gives you *another big plus:* smoother ride, less wear on trucks and tracks. It all adds up to one logical choice, which more and more lines are making:

HYATT

RUNNING MATE OF FASTER FREIGHT

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

ROLLER BEARING JOURNAL BOXES

STEEL WHEELS AT LOWER COST

PROVEN
in 13 years of research

PROVEN
in 7 years of road service

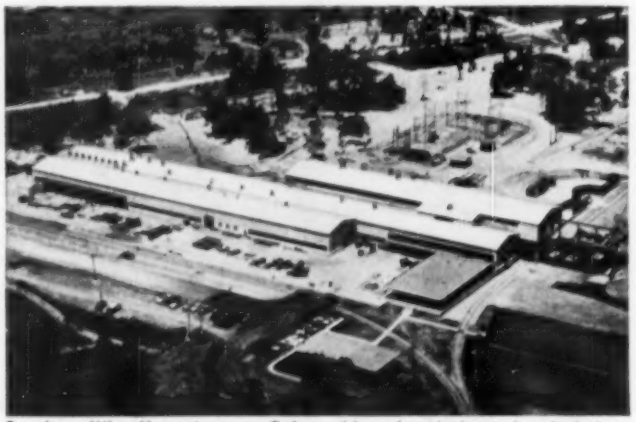
PROVEN
in 5 million test car miles

The Southern steel wheel, approved for interchange and designated AARX-2 by the A.A.R., is a time-tested, time-proven wheel. You can put this steel wheel under your freight cars *at lower cost* than other steel wheels!

This new cast steel wheel is the outgrowth of a research project inaugurated in 1941, of a road test program begun in 1947 and continuing to the present time. Service records prove that the Southern cast steel wheel delivers extra strength, extra stamina, extra actual miles in service. Car after car in regular service has rolled up well over 100,000 miles; and two of them have passed 300,000 and are still going strong.

The Southern steel wheel owes its exceptional performance to its unique metallurgical structure. Cast of 1.5% carbon steel, of an analysis similar to that of die steel, it is subjected to an exacting double heat treatment to develop to the fullest the optimum properties of the metal. Electric furnace melting gives close control of analysis, and conventional sand molds with chillers are used to produce directional solidification and dense tread metal. After the wheels cool below critical temperature, the two-stage heat treatment refines grain, relieves stress, and spheroidizes the carbides. The result is an extremely wear-resistant metal, with a high degree of toughness. There are no transition areas—the metallurgical structure is uniform from flange to hub.

Throughout manufacture, there is no compromise with quality in producing Southern cast steel wheels. Modern instrumentation and sensitive automatic controls are used extensively for utmost accuracy. Special equipment performs all machining operations at a single chucking, producing an inherently balanced wheel with all machined surfaces square and concentric.



Southern Wheel's entire new Calera, Ala., plant is devoted exclusively to the high quality, high volume production of cast steel wheels. It is Brake Shoe's most recent project for better serving the needs of American railroads.

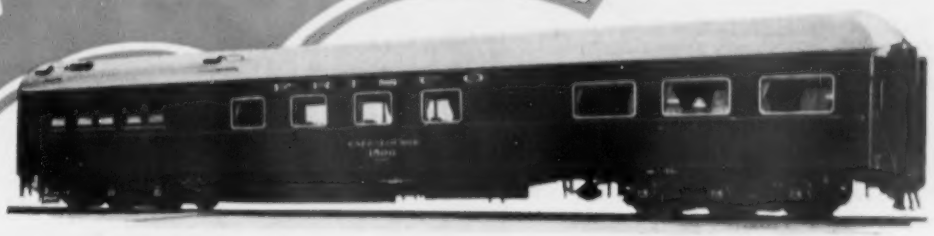
AMCW

SOUTHERN WHEEL DIVISION

AMERICAN Brake Shoe COMPANY

230 Park Avenue, New York 17, N.Y.

On the FRISCO



WAUGHMAT

DOUBLE ACTING *Twin Cushions*

smooth the ride...

In 1931 — 24 years ago — the St. Louis-San Francisco railway equipped a business car with Waughmat double acting Twin Cushions. *Every piece of the original rubber is still in service.*

Since that time, all new streamline passenger cars and all business cars have been *100%* Twin Cushion equipped. 65% of the conventional cars are Twin Cushion and two years ago 100 95 ton ore cars were also equipped with Waughmat Twin Cushions. More than 10,000 Waugh-Gould friction gears are also in Frisco service.

WAUGH EQUIPMENT COMPANY

New York · Chicago · St. Louis · Canadian Waugh Equipment Company, Montreal

For Boiler Retubing

USS NATIONAL SEAMLESS offers the utmost in strength, safety and long life

HUNDREDS of steam locomotives that had presumably seen the best years of their lives have been rejuvenated with sound, dependable National Seamless Boiler Tubes — for thousands of miles of additional service.

USS National Seamless Boiler Tubes can attribute their outstanding record for dependability and long life to the unique method by which they are made, *the piercing process.*

Only the soundest, most uniform steel will withstand the rigorous piercing operation. No other tube-making process so drastically tests the quality of the steel or, what is equally important, so completely removes all uncertainty regarding uniform wall strength. Every National Seamless Tube is a continuous piece of steel, offering the safety, security and dependability of a solid steel forging.

All steels used in National Seamless Boiler tubes are of the "killed" type—thoroughly deoxidized before being cast into ingots. This results in better heat transfer characteristics and higher creep strength at elevated temperatures. Moreover, improved methods of processing insure the right balance between strength and ductility to permit the utmost ease of installation. Our distributors bend boiler tubes. We will be glad to furnish the name of the distributor in your territory, upon request.

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

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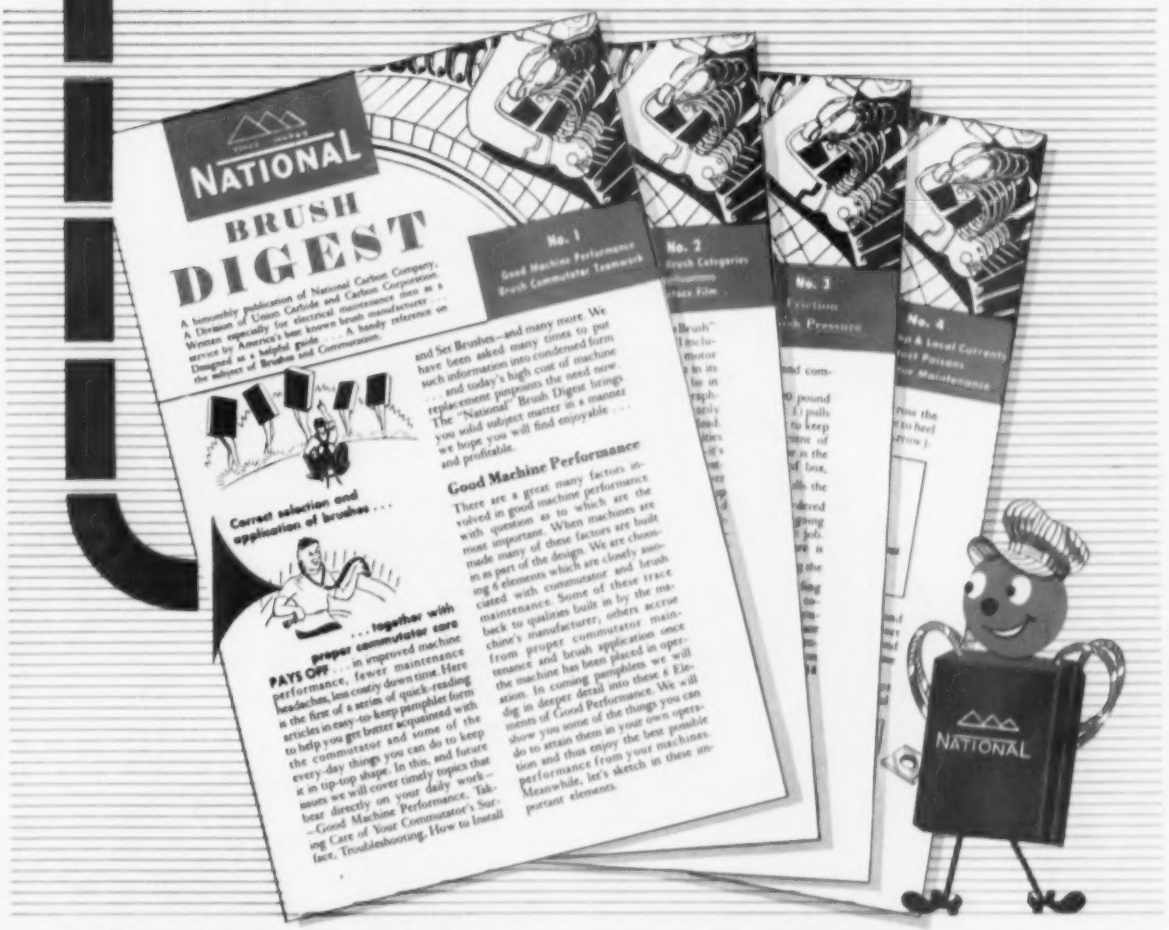
USS **NATIONAL Seamless BOILER TUBES**

SEAMLESS WITHOUT WELDS

UNITED STATES STEEL

ORDER THIS FREE TWO-YEAR COURSE IN MOTOR AND GENERATOR MAINTENANCE


NATIONAL
BRUSH
DIGEST
A bimonthly publication of National Carbon Company, A Division of Union Carbide and Carbon Corporation. Written especially for electrical maintenance men as a service by America's best known brush manufacturer . . . Designed as a helpful guide . . . A handy reference on the subject of Brushes and Commutators.
No. 1
Good Machine Performance
Brush-Commutator Teamwork
No. 2
No. 3
No. 4
Good Machine Performance
Correct selection and application of brushes . . .
. . . together with proper commutator care
PAYS OFF . . . in improved machine performance, fewer maintenance headaches, less costly down time. Here is the first of a series of quick-reading articles in easy-to-keep pamphlet form to help you get better acquainted with the commutator and some of the every-day things you can do to keep it in tip-top shape. In this, and future issues we will cover timely topics that bear directly on your daily work—Good Machine Performance, Taking Care of Your Commutator's Surface, Troubleshooting, How to Install and Set Brushes—and many more. We have been asked many times to put such information into condensed form . . . and today's high cost of machine replacement pinpoints the need now. The "National" Brush Digest brings you solid subject matter in a manner we hope you will find enjoyable . . . and profitable.
There are a great many factors involved in good machine performance with question as to which are the most important. When machines are made many of these factors are built in as part of the design. We are choosing 6 elements which are closely associated with commutator and brush maintenance. Some of these trace back to qualities built in by the machine's manufacturer; others accrue from proper commutator maintenance and brush application once the machine has been placed in operation. In coming pamphlets we will dig in deeper detail into these 6 Elements of Good Performance. We will show you some of the things you can do to attain them in your own operation and thus enjoy the best possible performance from your machines. Meanwhile, let's sketch in these important elements.
NATIONAL

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This new use for the automatic UNIONMELT welding method is just one more added to the long list of money-saving applications for car repairs and construction.

Why don't you get more information on how UNIONMELT welding can speed operations and cut costs in your shops.

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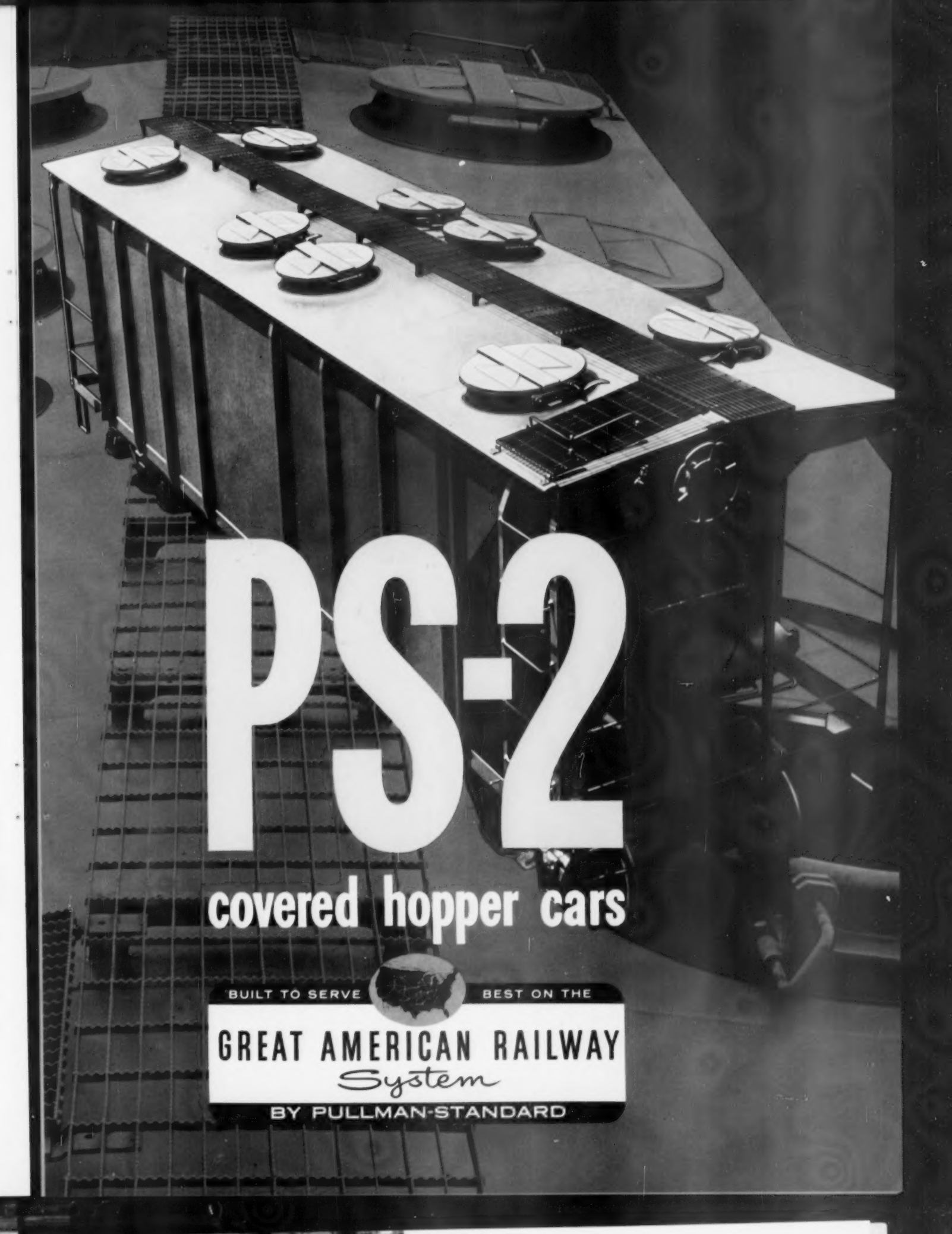
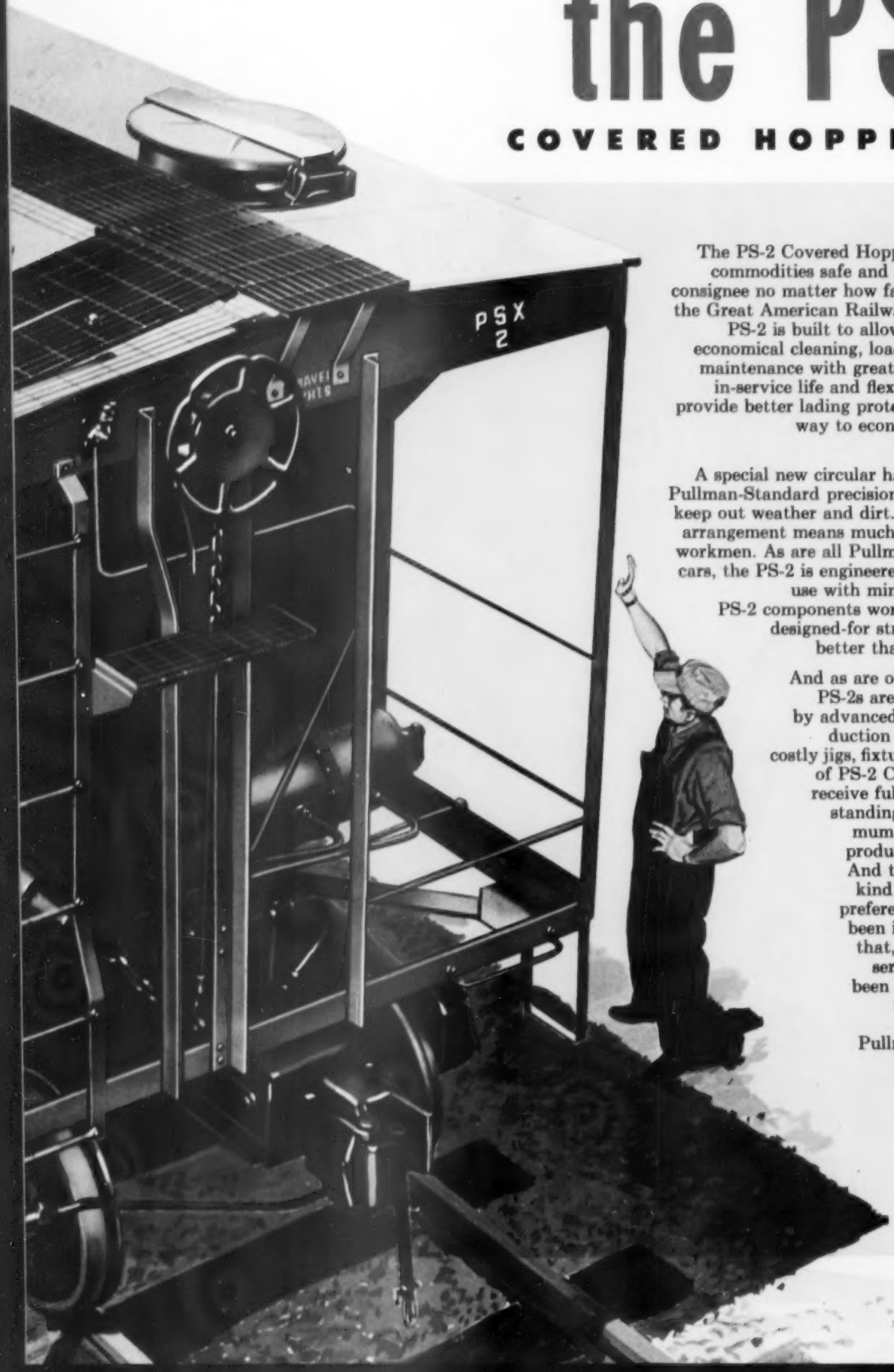

PS-2
covered hopper cars
BUILT TO SERVE
BEST ON THE
GREAT AMERICAN RAILWAY
System
BY PULLMAN-STANDARD

the PS-2

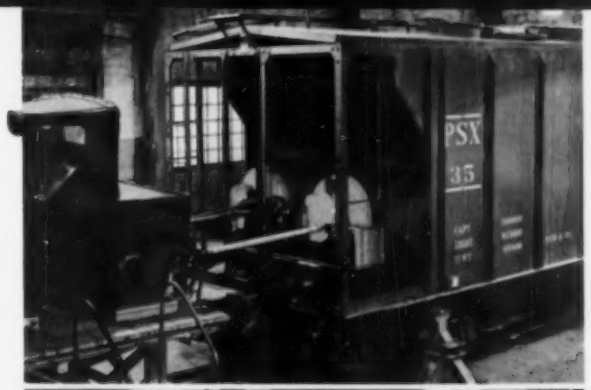
COVERED HOPPER CAR

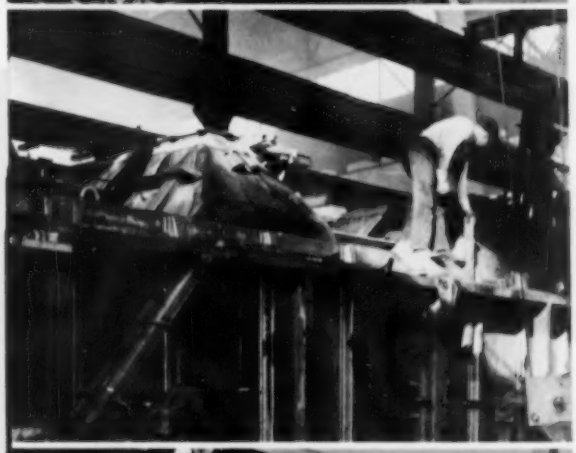


The PS-2 Covered Hopper Car carries bulk commodities safe and dry from shipper to consignee no matter how far apart they are on the Great American Railway System. And the PS-2 is built to allow easier, safer, more economical cleaning, loading, unloading and maintenance with greater speed. Its longer in-service life and flexible standardization provide better lading protection and point the way to economical new avenues of railroad revenue.

A special new circular hatch is coupled with Pullman-Standard precision fabrication to help keep out weather and dirt. And the new hatch arrangement means much safer conditions for workmen. As are all Pullman-Standard freight cars, the PS-2 is engineered for long in-service use with minimum maintenance. PS-2 components work together to create designed-for strength that is vastly better than costly bulk alone.

And as are other PS freight cars, PS-2s are precision fabricated by advanced methods using production line techniques with costly jigs, fixtures and dies. Buyers of PS-2 Covered Hopper Cars receive full value through outstanding performance, minimum maintenance, major production-run economies. And they benefit from the kind of shipper-consignee preference that has already been indicated by the fact that, of the PS-2s now in service, over 2045 have been bought by seventeen railroads. Such individual usage verifies Pullman-Standard beliefs in the superiority of the PS-2 Covered Hopper Car.





PS-2 Covered Hopper Cars are available in three sizes . . . 2003, 2893 and 3132 cubic feet.

No matter which of the three sizes is selected, buyers are assured the features, durability and economy that are characteristic of all PS rolling stock. The standardized PS-2 includes continuous Research and Development (left, top) which submits cars and manufacturing processes to continuous tests and studies impossible for limited production cars.

PS multiphase production is important, too. Modern production methods (left, center) concentrate the specialized skills of highly trained craftsmen on segments of PS-2s as they pass from position-to-position during fabrication. Such multiphase production provides precision building at low cost.

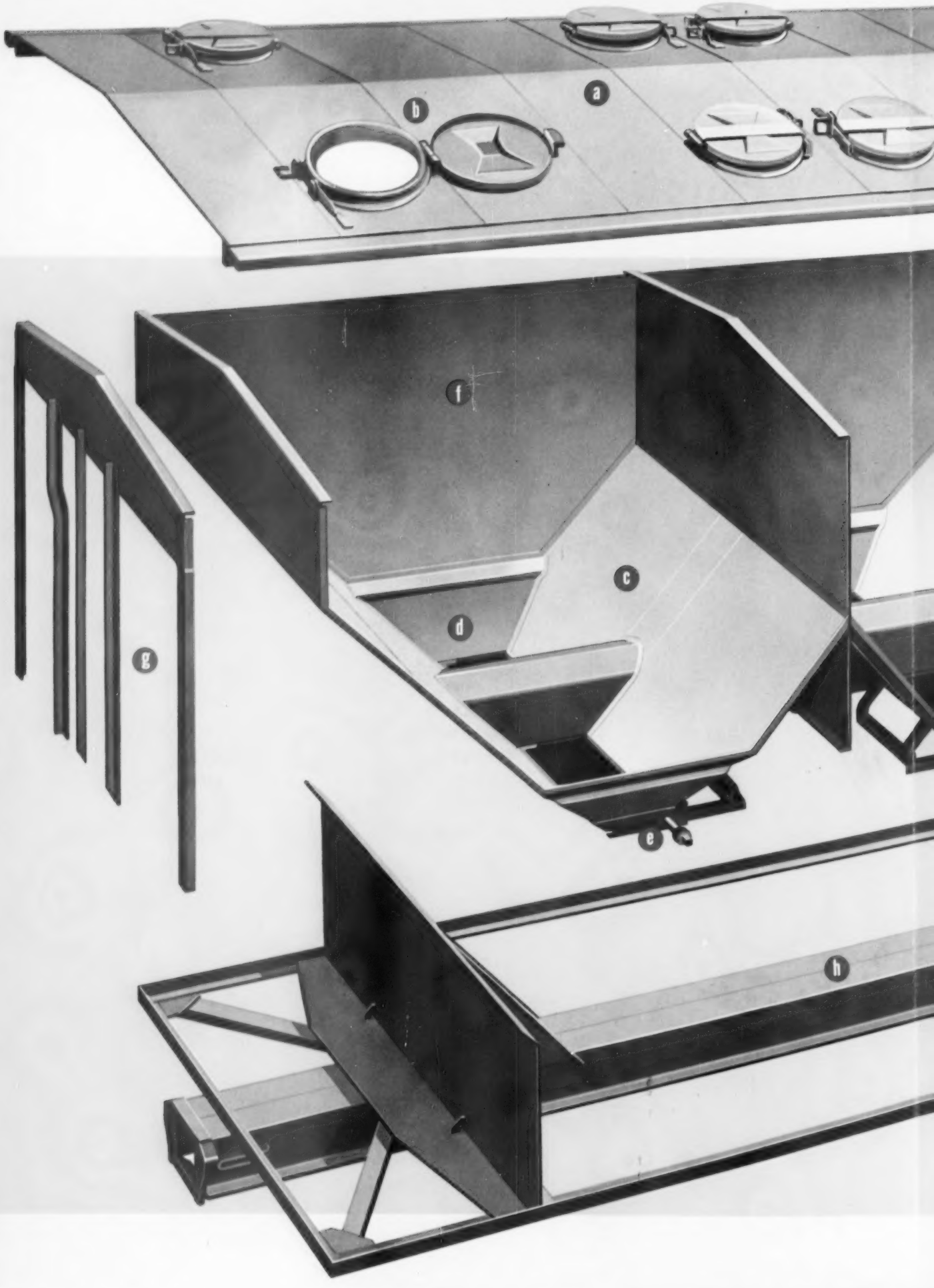
And PS-2s are followed into the field for documented verification of their performance by Sales and Service Engineers. Inspections are made under actual operating conditions (left, bottom) and weaknesses or advantages reported to Pullman-Standard for consideration in future PS-2 Covered Hopper Cars.

The success of the principle of standardization is demonstrated, individually and as a group, by the PS-2 Covered Hopper Cars serving The Great American Railway System.

2045 PS-2S TO 17 RAILROADS*

Pennsylvania
Chicago Great Western
C.R.I.&P.
Wabash
C.I.&L.
Union Pacific
Maine Central
Southern
C.M.St.P.&P.
New Haven
A.T.&S.F.
Southern Pacific
Kansas City Southern
Western Maryland
Delaware & Hudson
C.B.&Q.
Illinois Central

*Plus 166 PS-2s to FOUR other USERS as of February 1, 1955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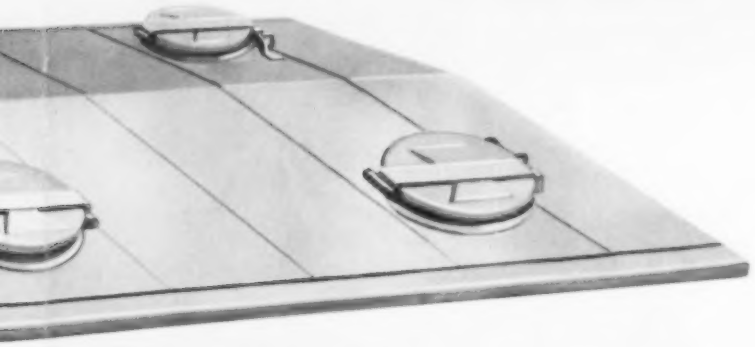
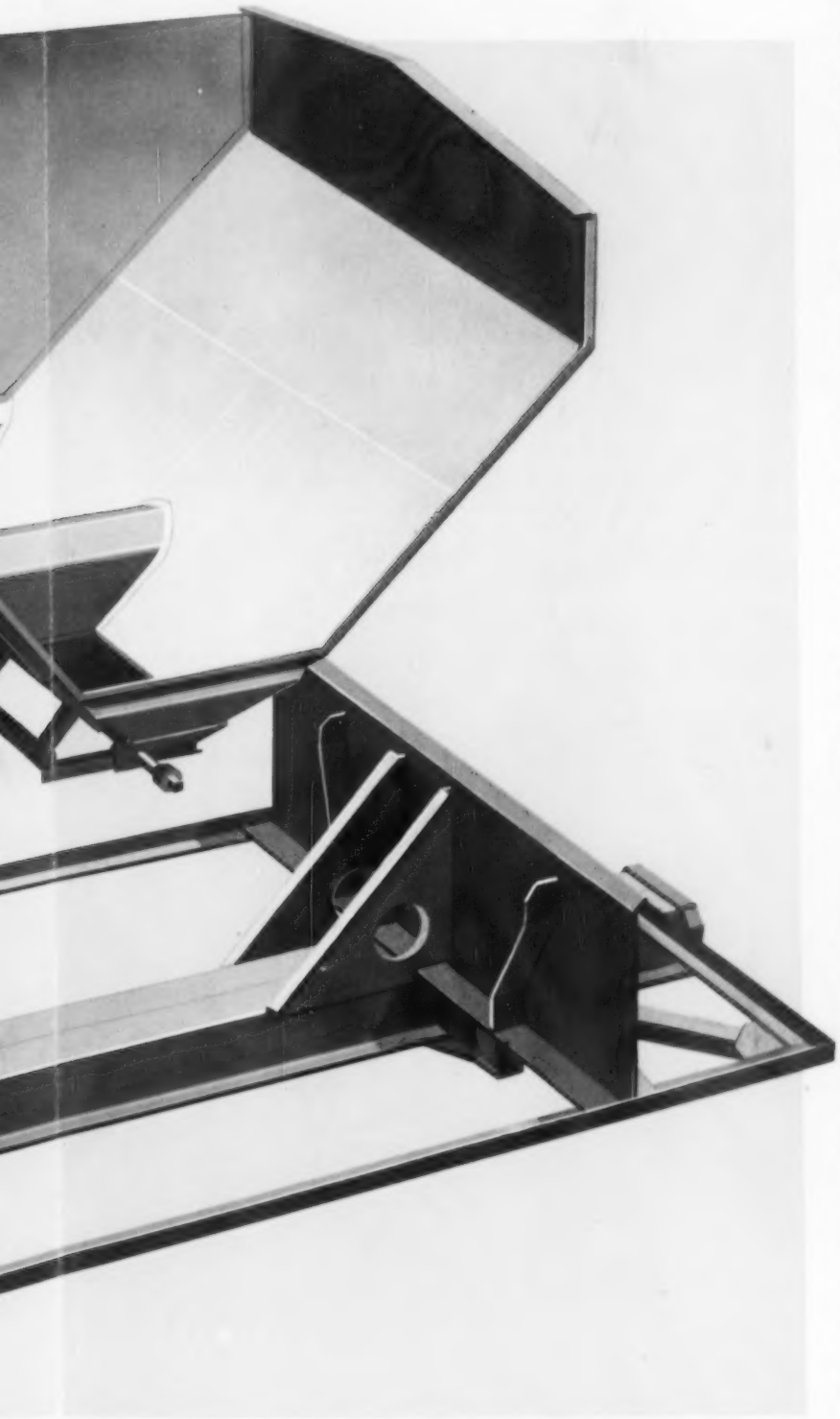




a THE PS-2 ROOF. Built up of roof sheets and carlines, the PS-2 roof can accommodate any number of hatches, wherever specified. Roof breakage is eliminated by use of new circular hatches. The roof is smooth, and has bulb angle side plates that eliminate catch-all ledge.

b THE PS-2 HATCH AND HATCH COVER. New circular hatches and covers prevent weather from being trapped against hatch sides, and forced up under covers, into lading. 6½" hatch combings facilitate roof cleaning. Hatch placement, and covers that open along the car's longitudinal axis, contribute to easy operation and worker safety. Hatch covers lock with special center pressure locking points that seal covers individually. Hinges are especially rugged, while latches are positive but easily reached and operated.

c THE PS-2 FLOOR SHEETS. Sloping floor sheets are of a 5/16" plate joined with longitudinal welds. Positioned for maximum capacity plus high speed unloading, floor sheets, as throughout the entire PS-2 interiors, contain no structural pockets or material retaining ledges or laps.

d THE PS-2 HOPPER SHEETS. Of ⅜" plate for outside sheets and 5/16" plate for inside sheets, these units are designed to facilitate unloading and withstand abrasive action and sledge-hammer blows. Like such other components as end plates, side sheets, end posts and corner posts, hopper sheets are readily available and properly designed for long service.

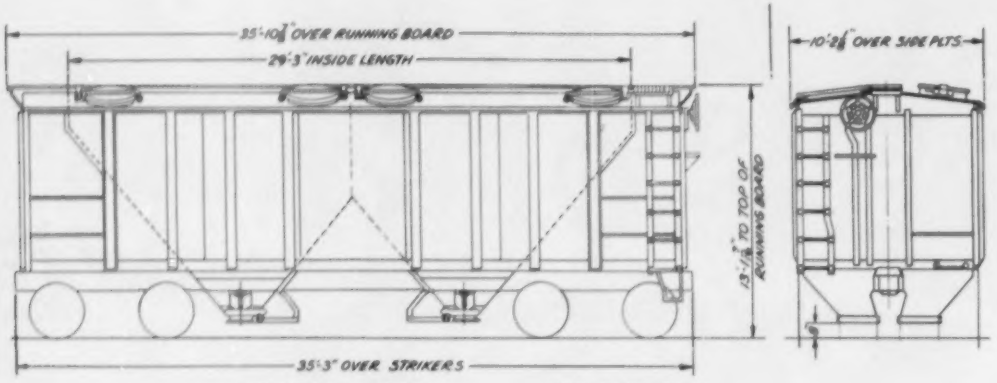
e THE PS-2 HOPPER GATES. Unloading gates are of standard design and construction. Hopper gates and chutes fit existing unloading accommodations. Location of chutes and gates within the rails permits easy, fast unloading of most granular materials into standard conveyors.

f THE PS-2 SIDE. Side has 4" bulb angle overhang at roof edge which keeps sides cleaner, lengthens paint life. The side sill is turned in to eliminate material retaining ledge. Sides are welded, eliminating possibility of corrosion and leakage around rivet holes. Heavier side sheets reduce unloading damage from sledging.

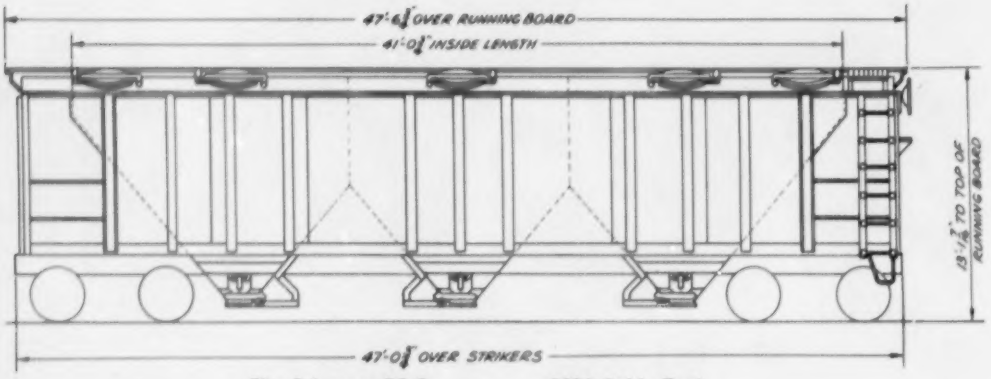
g THE PS-2 END. Ends are formed of a one-piece pressed 3/16" plate. They are designed for easier cleaning and painting, while safety is considered in the simplified ladder and step.

h THE PS-2 UNDERFRAME. PS-2 underframe components such as center, side and end sills, diagonal braces, body bolsters, strikers and front draft lugs are specially designed and tested for maximum strength under all types of lading and service conditions. All components are readily available and are easily maintained or replaced.

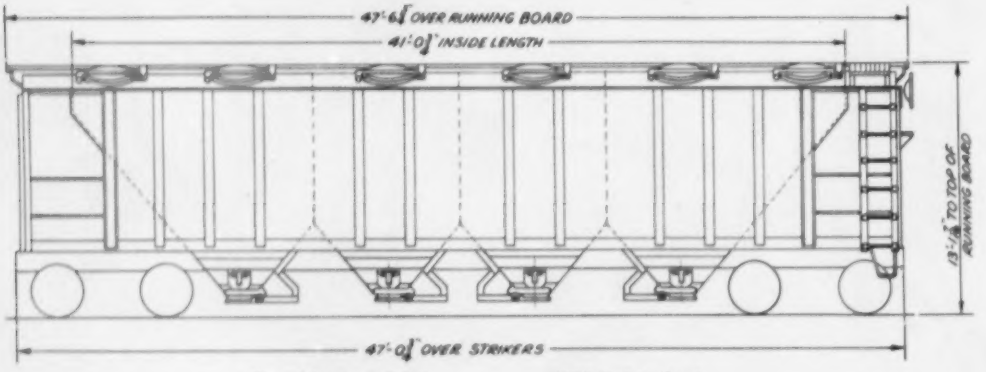
3 PS-2 Covered Hopper Car sizes offer capacity variations



The 2 hopper PS-2 **2003 Cubic Feet**



The 3 hopper PS-2 **2893 Cubic Feet**



The 4 hopper PS-2 **3132 Cubic Feet**

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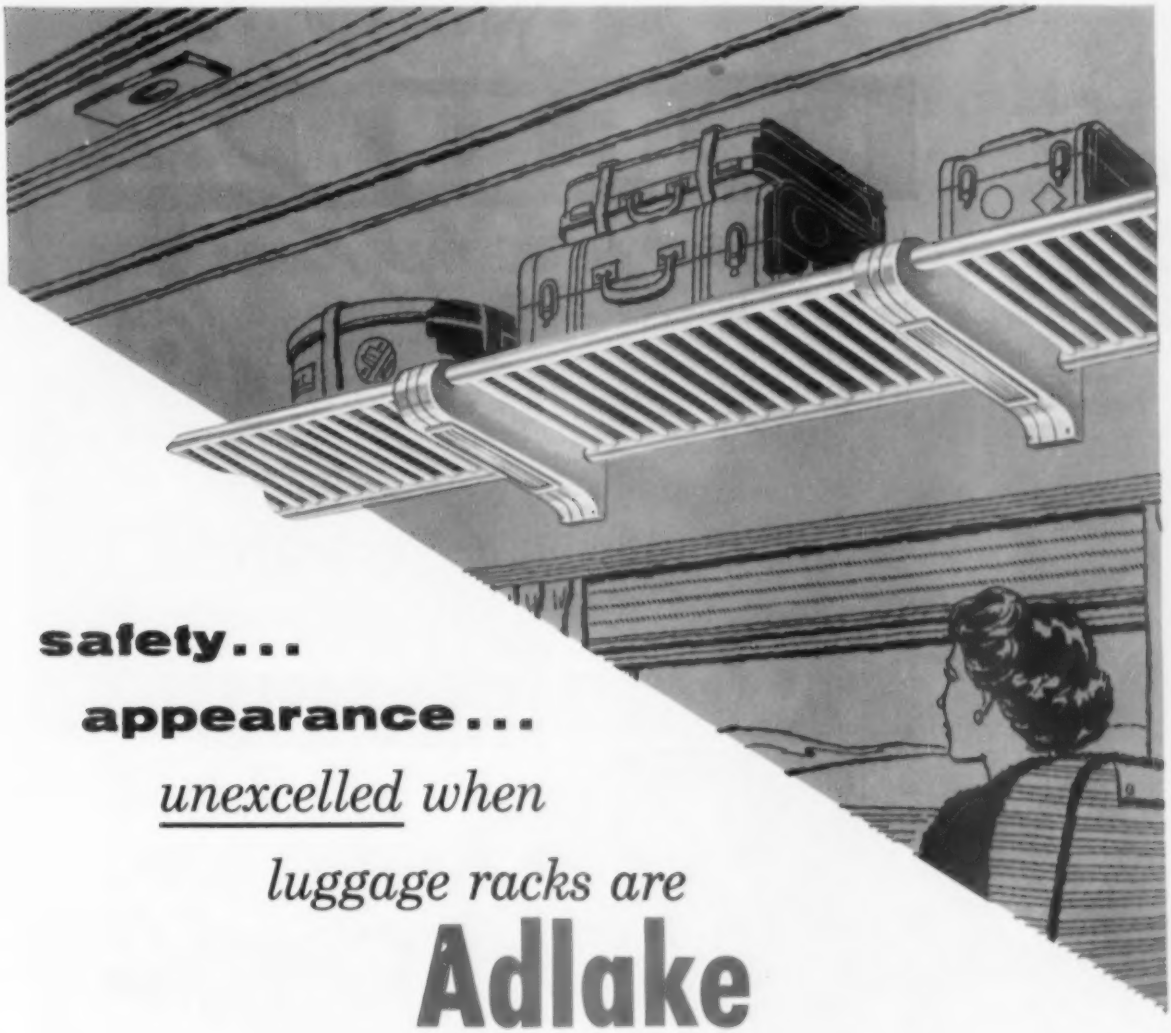

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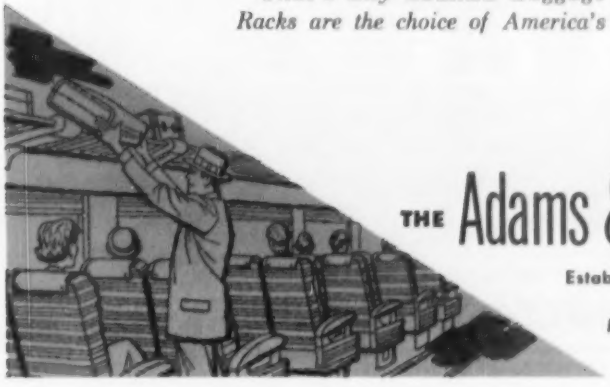

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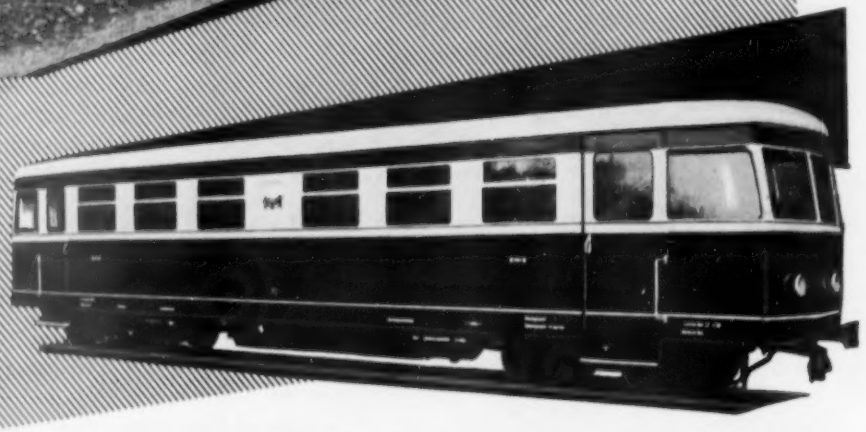

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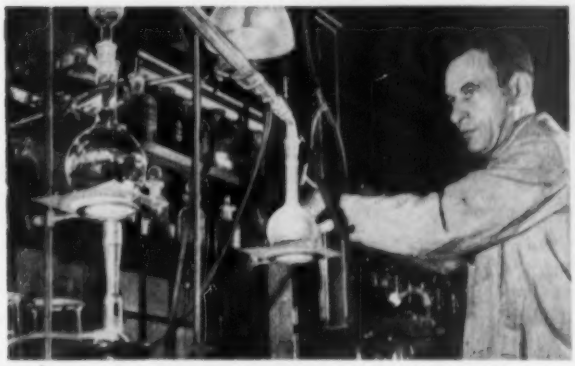

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✓**GOOD MAINTENANCE PROCEDURE**—All motive power is carefully examined at scheduled intervals under the supervision of F. J. Hoffelt, Frisco Diesel Foreman shown with Master Mechanic E. S. Wood.

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Because the National C-1 truck smothers vertical and lateral shocks there is less pounding on the roadbed.

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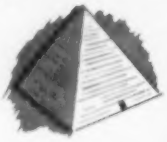

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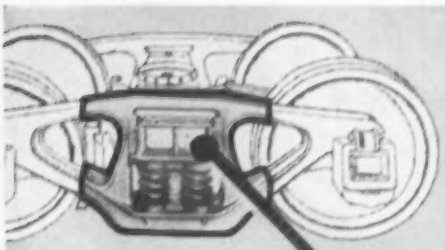

Conventional Freight Car Truck with Long Travel A.A.R. All-Coil-Spring Group and Unit Snubber.
(See illustration below*)

FRISCO

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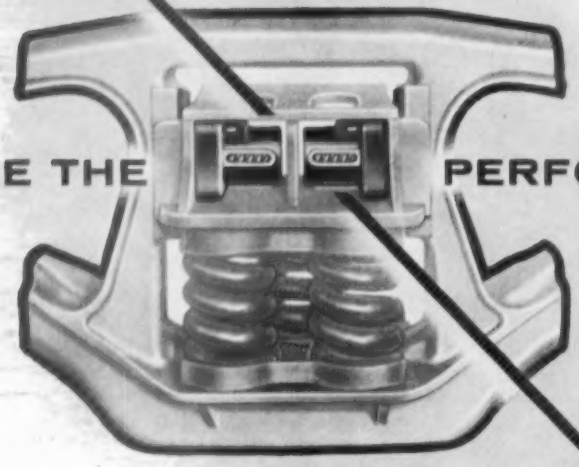
to the 'FRISCO' Mechanical Department on its many achievements



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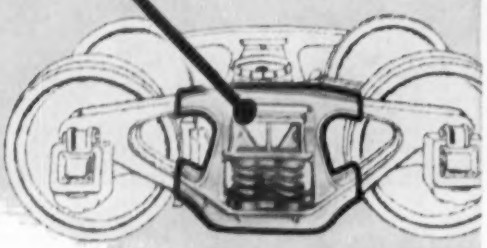
Modern High-Speed Freight-Car Truck



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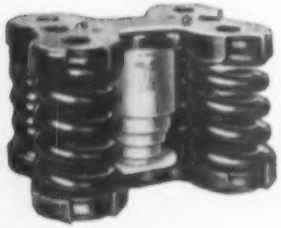

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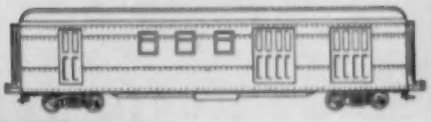
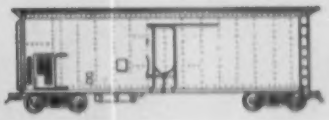
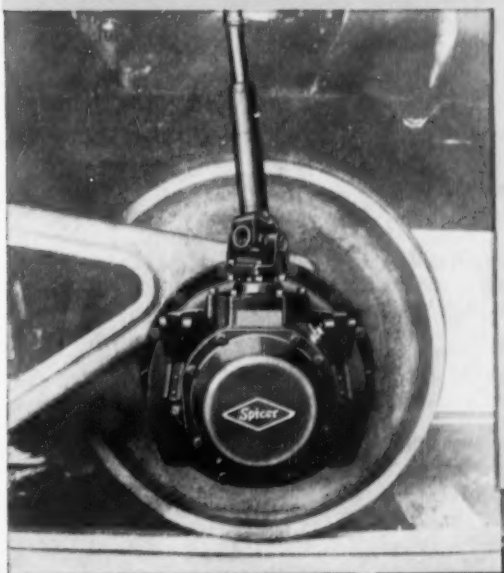
FOR CABOOSES

BAGGAGE CARS



FRUIT CARS





This new Spicer Generator Drive fills a long-felt need for a small, low cost, positive drive to supply power for the smaller generators. It is a simple, light weight, efficient drive, designed especially for use with two-way radio, lighting and other electrical equipment on caboose, baggage, mail and refrigerator cars.

Several years of research and intensive road testing have proved the correctness of design in this small Spicer Drive. It is a fitting companion to the large, time-proved Spicer Generator Drive, of which there are now more than 10,000 in use.

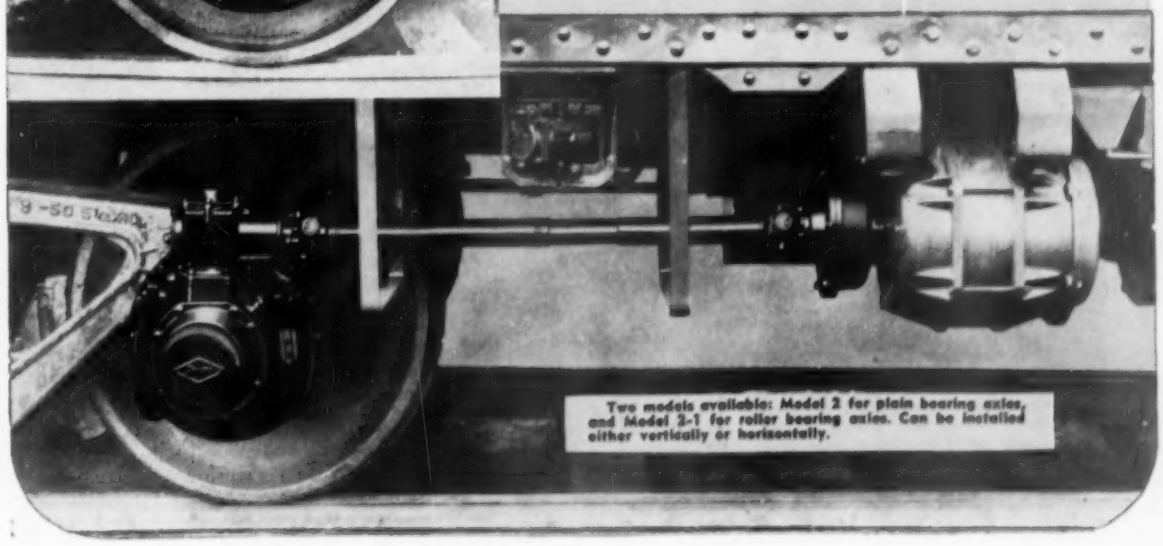
FEATURES

Greater Safety	Quiet Operation
Easy Adaptability	Quick Inspection
Reliability	Low Maintenance
No Belts or Chains	Quality Construction

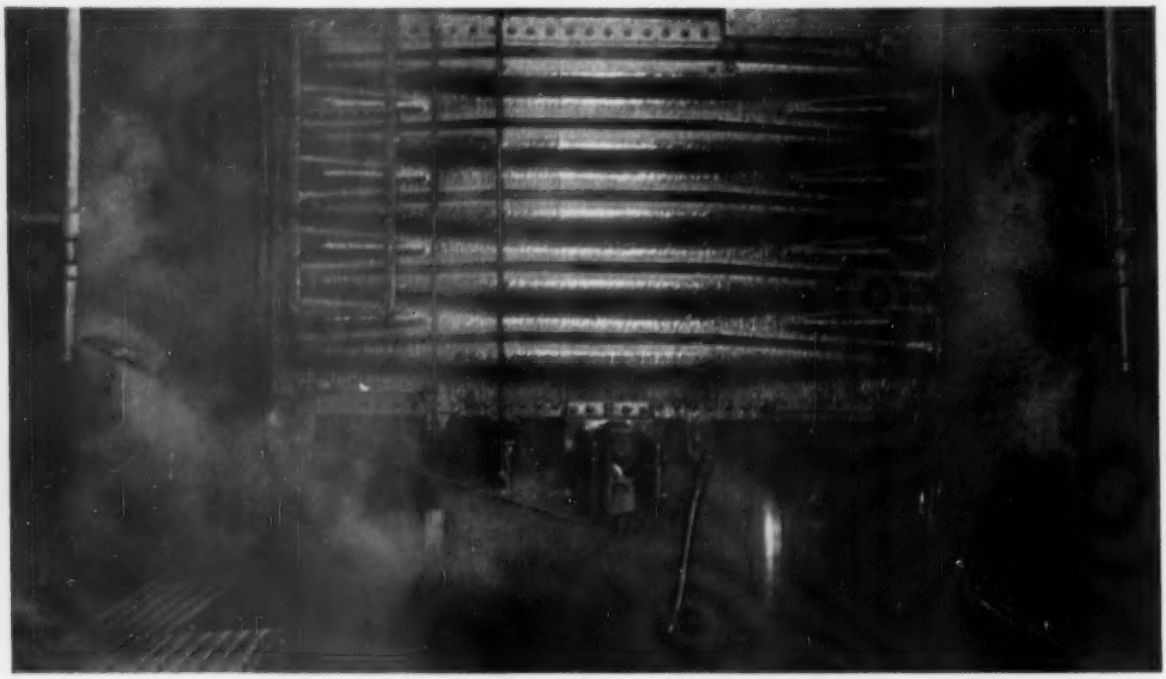
Attractively Priced

Write for illustrated bulletin No. 323 giving complete details of the new small ½ to 5 KW Spicer Generator Drive.

DANA CORPORATION, TOLEDO 1, OHIO



Two models available: Model 2 for plain bearing axles, and Model 2-1 for roller bearing axles. Can be installed either vertically or horizontally.



7 to 8 minutes in hot spray of WYANDOTTE-21 *solution strips paint from entire car.*

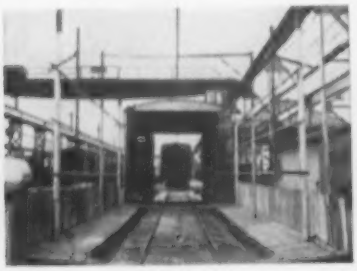
First: Follow this 50-ton N&W boxcar through the paint-stripping operation. Even if there are 20 coats of paint on the car, WYANDOTTE-21 will strip them in a matter of minutes!

In 7 to 8 minutes, from this Norfolk

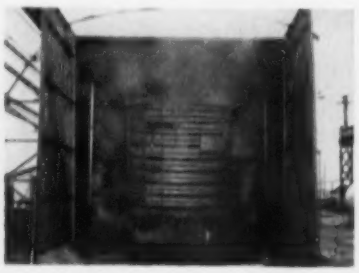
Norfolk and Western Railway conducts exhaustive study in paint stripping . . . proves procedures . . . plans expanded facilities for future . . . sees savings with WYANDOTTE-21.

The Norfolk and Western Railway Company set tough standards for paint stripping: they wanted a method that would strip the paint from a car for under $10, and do it *in minutes* — not hours! After seeing an on-the-job test of WYANDOTTE-21 stripper, they installed the full-sized stripping tunnel shown here.

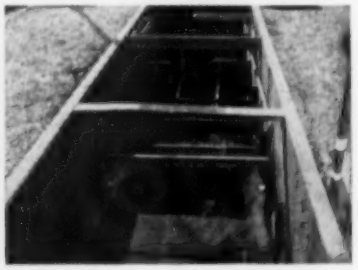
Today, after stripping more than 350 cars, WYANDOTTE-21 has more than met N&W's requirements. Costs are below $7 per car, and stripping time runs approximately 8 min. per car! Paint stripping with WYANDOTTE-21 is now a standard N&W procedure.



2 ***Car approaches*** stripping tunnel. Notice drains and simplicity of equipment. Both tunnel and rinsing station (foreground) use 3 lengths of spray pipe to a side, one on top, with nozzles set at intervals. Vertical pipes spray car ends.



3 ***In N&W's stripping tunnel*** nozzles spray WYANDOTTE-21 solution over car (end doors opened for illustration). WYANDOTTE-21 is also excellent for stripping paint by flow-on or immersion process. A powder, it goes into solution quickly.



4 ***Tank,*** set in ground, holds the WYANDOTTE-21 solution. After solution is pumped to tunnel and sprayed on car, it drains back to tank to be used over and over again. This substantially cuts costs per gallon per car.

SEE N&W'S PAINT-STRIPPING PROCESS IN COLOR!

Completely stripped, car will be phosphatized to neutralize any residual alkali, passivate rust, and insure better paint bond.

Wyandotte-21 strips all paint and Western boxcar!

As a matter of fact, the N&W is so pleased with their operation, and the cooperation Wyandotte gave in setting it up, that they have made available to us a complete set of color pictures that show all details of this remarkably fast and low-cost process.

Wyandotte wants you to profit by this experience. We want you to see — in full color — how you can reduce metal deterioration, save on panel replacement, keep rolling stock new-looking with fast, low-cost WYANDOTTE-21.

To see these graphic N&W color pictures . . . to get the complete story on what WYANDOTTE-21 can mean to you in protecting your equipment and saving you money — mail the coupon today! *Wyandotte Chemicals, Wyandotte, Mich. Also Los Nietos, California.*

Wyandotte CHEMICALS

Helpful service representatives in 138 cities in the United States and Canada

Complete line of cleaners for all railway needs.

5 ***Cold-water spray*** rinses the stripped car. In stripping 350 cars, the N&W has found complete satisfaction in WYANDOTTE-21. Average cost per car is below $7. Stripping time: entire car in as little as 7 minutes! No hand labor.

6 ***Another N&W car*** (stripped and phosphatized previous to these pictures) shows a better looking, better bonded paint job. WYANDOTTE-21 is so effective and low-cost that the N&W plans to make stripping a standard procedure.

MAIL HANDY COUPON TODAY!

Wyandotte Chemicals Corporation
Dept. 2294
Wyandotte, Michigan

- ☐ Have a representative call with color story.
- ☐ Send FREE sample and test data on Wyandotte-21.
- ☐ Send FREE book on "Railroad Cleaners and Cleaning Procedures."

Name _____

Railroad _____

Department _____

Address _____

City _____ State _____

WELDERS and PURCHASING AGENTS ARE GRABBING HOLD of the new U. S. ROYAL Gold Fluted Welding Cable

HERE'S WHAT WELDERS SAY:

"[illegible] to handle. It's so light and flexible I don't [illegible] the usual 'drag.' A cinch to handle in cramped quarters."

"I get easier grip. The *fluted* jacket does it. U.S. Royal Gold coils easily, resists kinks and tangles."

"Easier to see because of the bright yellow color. I don't trip over it. And I can easily tell it from the black cable whenever I have to use *two* cables on the machine."

"The *fluted* jacket has a greater surface area. That makes the cable cooler to handle, because heat is dissipated quicker."

HERE'S WHAT PURCHASING AGENTS SAY:

"Longer service life. U.S. Royal Gold is so flexible we get fewer failures at terminal connections. Maintenance costs go down, replacements are few and far between."

"Superior impact resistance. Tests show that U.S. Royal Gold Welding Cable possesses greater resistance to impact than conventional constructions. It shows up on my cost sheets."

"Lower accident insurance charges. U.S. Royal's bright yellow color catches everyone's eye. It also keeps workmen from running vehicles over it or letting equipment drop on it. Result: U. S. Royal Gold lasts even longer."

"It has high resistance to moisture—thanks to its 60% natural rubber jacket and its 60% natural rubber insulation."

Made exclusively by United States Rubber Company and available at your electrical supply house.

WRITE ADDRESS BELOW FOR FREE FOLDER that gives facts demonstrating the superiority of U. S. Royal Gold Fluted Welding Cable.

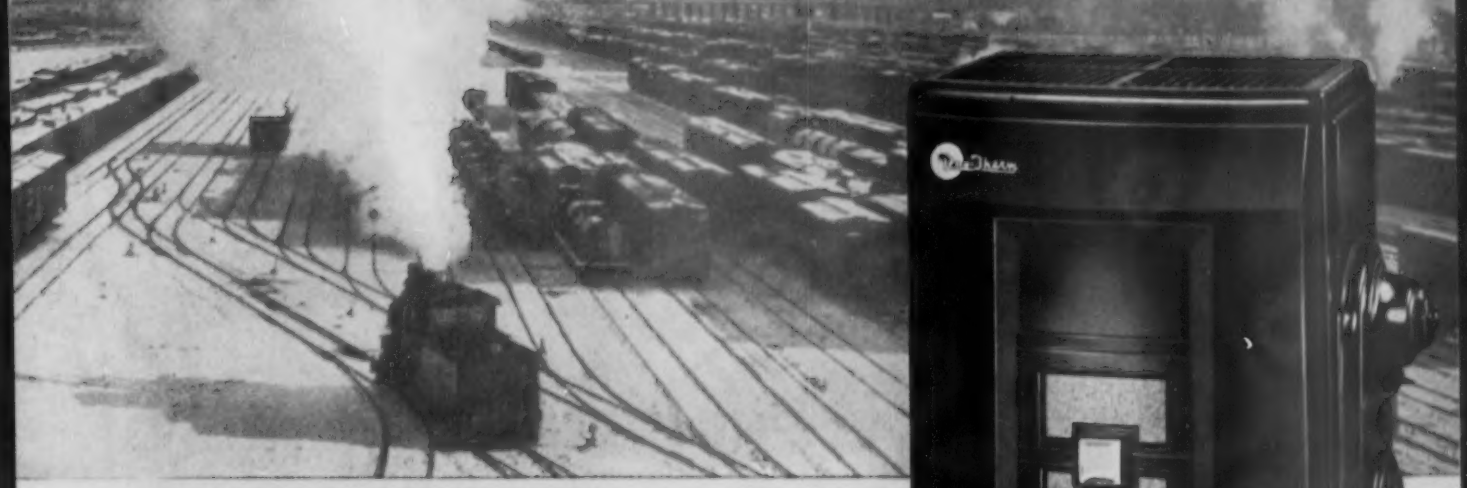
US RUBBER

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department • Rockefeller Center, New York 20, New York.

Railroad Built

DUO-THERM SPACE HEATERS



MANY IN SERVICE ON LEADING RAILROADS
(USES ANY DIESEL OIL!)

Duo-Therm Railroad Space Heaters, made by the largest manufacturer of home heaters, are designed to work efficiently with any railroad diesel fuel oil.

Oversize patented Dual-Chamber Burner heats large work cars on coldest days—gets maximum heat from every drop of oil. Power-Air Blower, optional at extra cost, saves up to 25% on fuel by distributing heat evenly over a large area. Makes heater ideal for depots, offices and shops.

Duo-Therm Heaters can take punishment too! They are built with extra strength that assures long life under severe service conditions.

You get more for your money with a Duo-Therm Railroad Space Heater. Only Duo-Therm has so many exclusive features.

MODEL 724R Railroad Work Car Oil Heater. 53,000 B.T.U. output. 44½" high, 26" wide, 24" deep. Special Self-leveling control for mobile use.

More than 2½ million warmly satisfied customers

DUO-THERM

Division of MOTOR WHEEL CORP., Lansing 3, Michigan

Oversize Dual-Chamber Burner with floating flame for quiet operation from high to low fire. Built oversize for extra heat on cold days.

All Steel Welded Heat Chamber stands up under rough use, quickly transfers heat to room. Burner and heat chamber form single heating unit.

Waist High Dial Control, easy to see, easy to adjust. No reaching down alongside hot stove. Dial temperature as easy as dialing your radio.

Special Self-Leveling Control. Do-nut floating type—permits steady flow of fuel for mobile operation. Drip tray drains through floor.

Base Braces and Anchors secure heater for sudden shocks encountered in mobile work cars. Firm, rigid. Easily detached for portability.

Cooking Stove Top! May be ordered in place of conventional grille. Large, 18 x 26 inches, cast steel. When ordering, specify Model 724 RX.

Duo-Therm Railroad Water Heaters—built for rough use, 12 to 50 gal. capacities. Diesel, LPG, or electric heating elements. Write for full details.

National Railway Sales Representative

Distributed by T-Z RAILWAY EQUIPMENT COMPANY, INC.,

G. S. TURNER, *President* • 8 South Michigan Avenue, Chicago 3, Illinois

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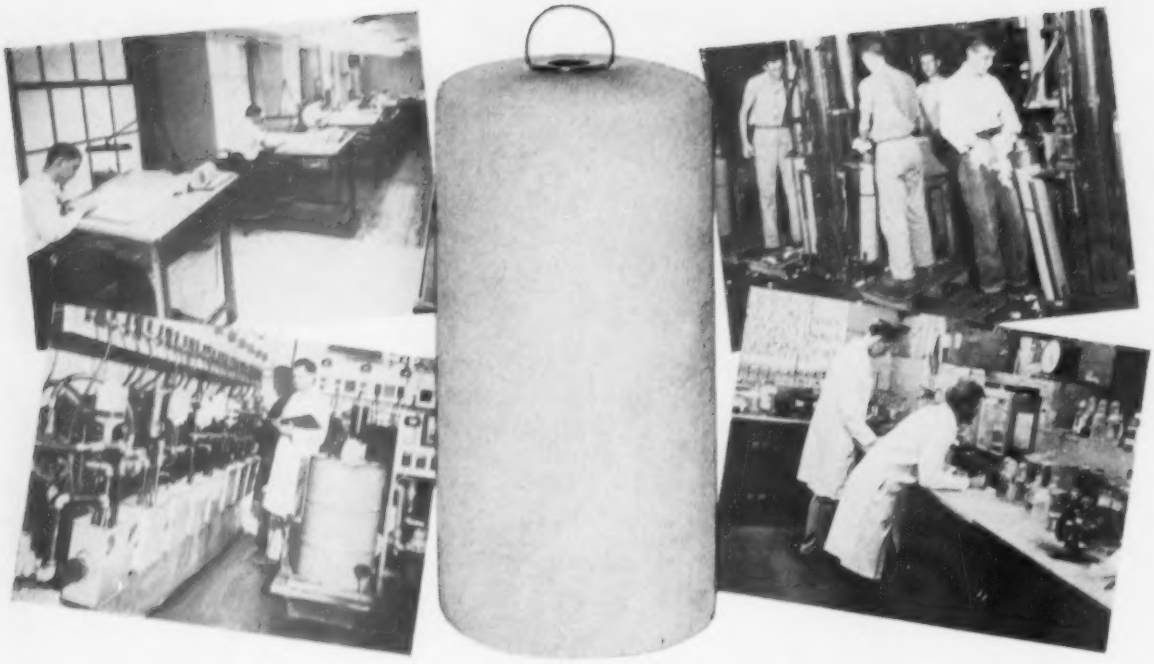


What is back of *wix* ENGINEERED FILTRATION

The research, analysis, testing techniques and engineering that go into a WIX Oil Filter Cartridge do not show in the outward appearance of the product. But they DO show where it counts...*in engine-saving performance.*

WIX engineers fully appreciate the cost factors of repairs, maintenance and down-time with diesel equipment. They maintain a continuing study of fuel and lube oil filtration with the result that many Railroads across America are turning to WIX for qualified assistance with their oil filtration problems.

A Salute to the FRISCO

Whether the service be yard, freight or passenger locomotives or maintenance-of-way equipment . . . or filtering fuel oil at transfer points and cleaning it for trouble-free injection . . . WIX Engineered Filtration provides cartridges tailored to fit the need.

The WIX Catalog is a must for you . . . contains FULL information on the right cartridge for your filters plus a handy cross-reference chart you'll want to have at all times. Write for it!

wix TRADE MARK REG.

ENGINEERED FILTRATION

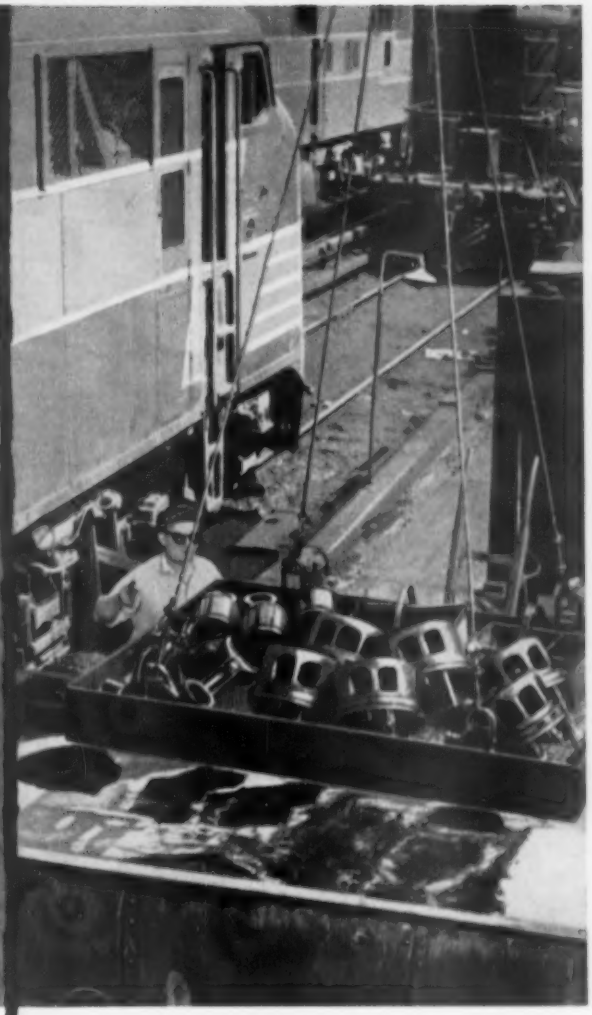
WIX CORPORATION • GASTONIA, N. C.

WAREHOUSES

GASTONIA NEW YORK DES MOINES SACRAMENTO ST. LOUIS

PENNSALT CLEANER 35—Soaks away soils—from road grime to baked-on carbon. Dissolves readily in alkali or mineral laden water without scum or sediment.

PENNSALT CLEANER 45-X—An ideal soak cleaner that also is an excellent spray for running gear.



The toughest parts come clean *fast* in this Pennsalt Cleaner soak tank, located in the shops of a major Eastern railroad.

One of these Pennsalt Cleaners will meet 95% of all your shop needs for maintenance cleaning of steel parts

Why stock a dozen types of cleaners when one of these two general purpose Pennsalt Cleaners will give excellent results at lower cost? They meet almost all your shop cleaning needs on steel parts—*and give you important extra advantages.*

Both are powerful, free rinsing, fused alkaline silicates. They have the sustained heavy duty action needed for thorough soak cleaning of diesel locomotive parts. They will do your pre-inspection cleaning, clean your air and oil filters, your cylinder heads and liners—even strip paint. They have low sludging qualities . . . need only occasional recharging.

Your Pennsalt Railroad Maintenance Man will be glad to recommend the right cleaners to meet your needs. You'll be surprised how few are needed for many jobs—how the *right few* increases shop efficiency.

Give your man a call today. Or write: Railroad Maintenance, Pennsylvania Salt Mfg. Co., EAST: 968 Widener Bldg., Philadelphia 7, Pa., WEST: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Favorite of the men in the shops

Pennsalt Chemicals

Use the TL&S Line IN ALL 48 STATES

THE TL&S LINE, of course, is the complete line of Texaco Lubricants and Service for railroads, available in all 48 States. For instance—

Texaco Dieseltex HD—the heavy duty, fully detergent and dispersive oil that assures clean diesel engine operation.

Texaco Airtac—the coating that assures maximum efficiency from diesel air filters.

Texaco Geartac RR—the traction motor gear lubricant for longer mileage between servicing periods in the new tight gear cases.

Texaco 979 Roller Bearing Grease—the fully AAR-approved grease for journal roller bearings, that assures longer bearing life, lower maintenance costs.

Texaco Car Oil 1960—the premium-quality car oil that assures more car miles per hot box set-off.

These and other Texaco Railroad Lubricants, plus Texaco Systematic Engineering Service, are available in all 48 States. Let a Texaco Representative give you full information. Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis, or Atlanta. Or write:

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Railroad Lubricants AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

TUNE IN: TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

EDITORIALS

Why the Frisco?

Contained within a special section of this issue is a comprehensive exploration of the mechanical department of one railroad—the Frisco. The 32 pages devoted to this study cover just about every aspect of the mechanical department from its overall organization to details of policy on the operation and maintenance of its cars and diesel. Two questions come to mind as to why such a sizable portion of *Railway Locomotives and Cars* is being devoted to a study of this nature.

First, why all this information on *one* railroad? By devoting a sizable section of an issue to digging deeply into just one department of one railroad we felt that we could present information of significance and value to all men in the department—and to those in other departments, for that matter—from the young man with little experience right up on to the department head. The young man can get an overall view of how a mechanical department operates while the department head can critically compare his ideas and methods with those of another road—the Frisco in this issue and others being considered for similar treatment in the future.

Second, why specifically the Frisco? We are not trying to say that this railroad has the best mechanical department in the country. Nobody could add up the good and the bad features of all railroads and come up with the answer as to which is best. The Frisco definitely belongs in the category of well-run mechanical departments. Its maintenance costs are favorable and, generally, have been declining over the past few years. It is an average size railroad. Its problems are typical of the industry, and its solutions are applicable to many other lines. Many of its ideas and methods should be of interest to men from other roads.

At the same time that we are presenting this analysis of Frisco mechanical operations, we are not neglecting or postponing the publication of other material of interest to our mechanical and electrical readers. The No. 1 problem of the railroad industry—the hot box—is dealt with in one of the feature articles and our regular coverage of electrical matters appears in its usual place, as do new devices, news and questions and answers.

Some Electrical Potentials

Present developments and future possibilities arising from new types of electrical equipment were discussed at the Winter General Meeting of the American Institute of Electrical Engineers held in New York, January 29—February 4, 1955. They are reported in the Electrical Section of this issue. Ten rectifier-type electric locomotives now being delivered to the New Haven constituted a topic of first importance. A performance report on the 100 rectifier-type cars now in service on the New Haven give this new type of motive power a clean bill of health. Since a rectifier operates as well at one frequency as another, the new cars and locomotives suggest straight electrification using commercial frequency (60 cycles) on the contact system with quantity-produced (diesel locomotive-type) traction motors.

Present types of germanium rectifiers suggest they might be used in locomotives and when, as, and if, silicon rectifiers are made practicable in large sizes, they will further improve the possibilities of such locomotives and cars, since they can tolerate a relatively wide temperature range.

Interference with communication lines by rectifier-type motive power made their use impossible when it was tried some years ago. Better rectifiers, aided by cooperation between the locomotive manufacturers and the communication circuit operators have successfully disposed of this problem.

Another subject of interest to all diesel, as well electric locomotive operators, are new types of motor and generator insulation. Under operating conditions common in railroad practice, it becomes a possibility that the copper of the coils may fail before the insulation.

Another subject presented is a d-c power supply for railway cars in which two relays have replaced a set of contact fingers and an exciter has disposed of the pole-changer. It is also described in this issue.

An electric rotary snow plow which utilizes power from a 1,600-hp diesel unit was described and discussed. Such equipment which can use so much power over a wide range of train speeds should have a salutary effect on snow removal in sections where rotaries are required.

The significant thing about all these developments is that they are almost revolutionary in character and they continue to appear in such numbers. The potentials of application of electrical equipment to railroad service are evidently far from being fully realized.

NEW BOOKS

RAILWAY CAR REPAIR SHOPS. A 28-page tabulation of railroad locations with an average monthly total of 311,820 minor, 133,422 medium, and 28,236 heavy rebuilding repairs. Based on statistics supplied Railway Age by 121 United States, Canadian, and Central American railroads. A first-of-its-kind study, listing 1,461 car, wheel shop and passenger car repair points. Prices: single copy, $2.00; 6 copies, $10.00; 12 copies $20.00; 25 copies, $35.00; 50 or more copies, $1.00 each *Simmons-Boardman Publishing Corporation, Research Department, 30 Church street, New York 7.*

Solid bearing cars earn equivalent of

$250,000 EXTRA REVENUE PER YEAR

on each 1000 car investment

You get more cars for your money when they're solid-bearing-equipped — and a bigger return per dollar of car investment regardless of traffic conditions.

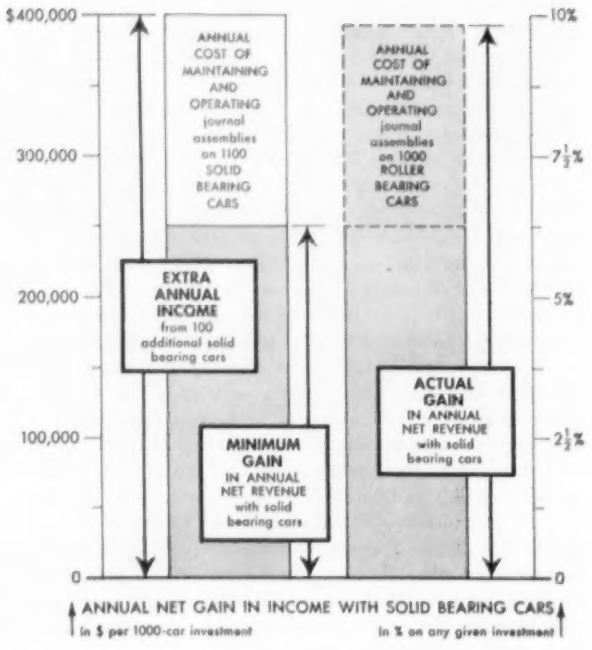
For the same amount of money needed to buy 1000 average roller bearing freight cars, you can buy 1100 or more solid bearing freight cars. And if you want to know what the *loss* on the roller bearing investment would be, here's a rule-of-thumb to figure it.

First, assuming the extra cars are needed, you estimate their average earnings. Then, from this sum, about $400,000.00, you subtract the difference, if any, in maintaining and operating journal bearing assemblies on 1100 solid bearing cars as opposed to 1000 roller bearing cars.

Conservatively, you'll find your minimum annual gain with solid bearings to be about $250,000.00, and it may be as much as $400,000.00.

By the same token, suppose you only need 1000 cars to meet your traffic requirements. With solid bearings, you reduce your initial costs by at least $600,000.00 and you get the same proportionate increase in return per dollar of car investment represented by the $250,000.00 to $400,000.00 above. And since both freight revenues and bearing operating costs are proportionate to car use, this comparative increase in return with solid bearings holds true regardless of traffic conditions.

Write us for a detailed analysis of the economic advantages of solid-type bearings for freight cars. We will also be glad to give you information about ways to improve journal bearing performance. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.


$400,000
300,000
200,000
100,000
0
10%
7½%
5%
2½%
0
ANNUAL COST OF MAINTAINING AND OPERATING journal assemblies on 1100 SOLID BEARING CARS
ANNUAL COST OF MAINTAINING AND OPERATING journal assemblies on 1000 ROLLER BEARING CARS
EXTRA ANNUAL INCOME from 100 additional solid bearing cars
MINIMUM GAIN IN ANNUAL NET REVENUE with solid bearing cars
ACTUAL GAIN IN ANNUAL NET REVENUE with solid bearing cars
ANNUAL NET GAIN IN INCOME WITH SOLID BEARING CARS
In $ per 1000-car investment
In % on any given investment

The left hand column indicates the average extra annual revenue that can be earned by buying 1100 solid bearing cars instead of 1000 roller bearing cars, and the center box indicates the minimum revenue gain that would result if the roller bearings could eliminate all maintenance and operating expense. The actual annual net gain, of course, would be this minimum gain plus roller bearing maintenance and operating costs as indicated in the right hand column.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Sometimes a successful operation depends upon the presence or absence of a sound management philosophy. The outline of this philosophy as set forth by Mr. Tuck may be the key to the "Frisco Story" on this and succeeding pages.

Communications-A Mechanical Department "Must"

The Frisco feels highly complimented by the recognition being given it this month by Railway Locomotives and Cars. Here on the Frisco, we are proud of the progress we have made in the operation of our mechanical department, but to have a publication such as this pay a tribute to us further enhances the pride we have in our organization.

. . . management policy . . . uncommon . . .

The Frisco has indeed made much progress in the operation of its mechanical department since it emerged from trusteeship in January, 1947. Behind this progress has been a management policy somewhat uncommon to the railroad industry in general, and perhaps even more uncommon to mechanical departments in particular.

. . . no ivory towers . . .

Perhaps the phrase which might best describe this policy is this: "There are no ivory towers on the Frisco." This was firmly established when President Clark Hungerford assumed command in 1947. Frisco employees of all ranks quickly discovered that Mr. Hungerford's idea of running a railroad was to get around on this railroad. This idea had merit, supervisory personnel learned when they tried it, too. They found they were running more efficient, happier departments and they also amassed a wealth of new ideas which helped to make their own jobs easier.

To sell 'want to' . . . is . . . most important

In the mechanical department, there have been outstanding results of following this system. To sell the "want-to" attitude throughout the entire department is, in my opinion, the most important single function of mechanical department supervisors.

. . . establish . . . communications . . . up

It is a simple matter for any supervisor to establish communications "down," but it takes time and effort on the supervisor's part to get communications "up." One of the most effective ways to bring about these "up" communications is to have enough interest in your men to know them—really to know them, so that when you walk into a shop you not only can call them by name but you can sit down and talk freely with them. It is at times like this with the employee in his own environment, so to speak—rather than across a desk in your office—that he feels free to express his ideas about his job and how he can improve it.

. . . benefit . . . is immeasurable . . .

The amount of benefit we have derived from this practice on the Frisco is immeasurable. Not only does this benefit Frisco operations, but it benefits those of us in supervisory jobs—it keeps us from adopting a "know-it-all" attitude and from "getting too big for our britches."

. . . effective . . . semi-annual meeting . . .

It is equally important to have two-way communications within the supervisory family. One way we have found to be effective is a semi-annual one-day meeting held between the chief mechanical officer and about twelve foremen. These foremen are representatives of an unofficial foreman's organization. They meet by themselves in the morning to discuss common problems and to set up an agenda for an afternoon session with the chief mechanical officer. In this way each foreman has a chance to have his problems considered by his fellow workers and also by his superior officer. At the same time, the other foremen learn solutions to problems they themselves may face some time and the chief mechanical officer discovers the chief difficulties confronting his lieutenants.

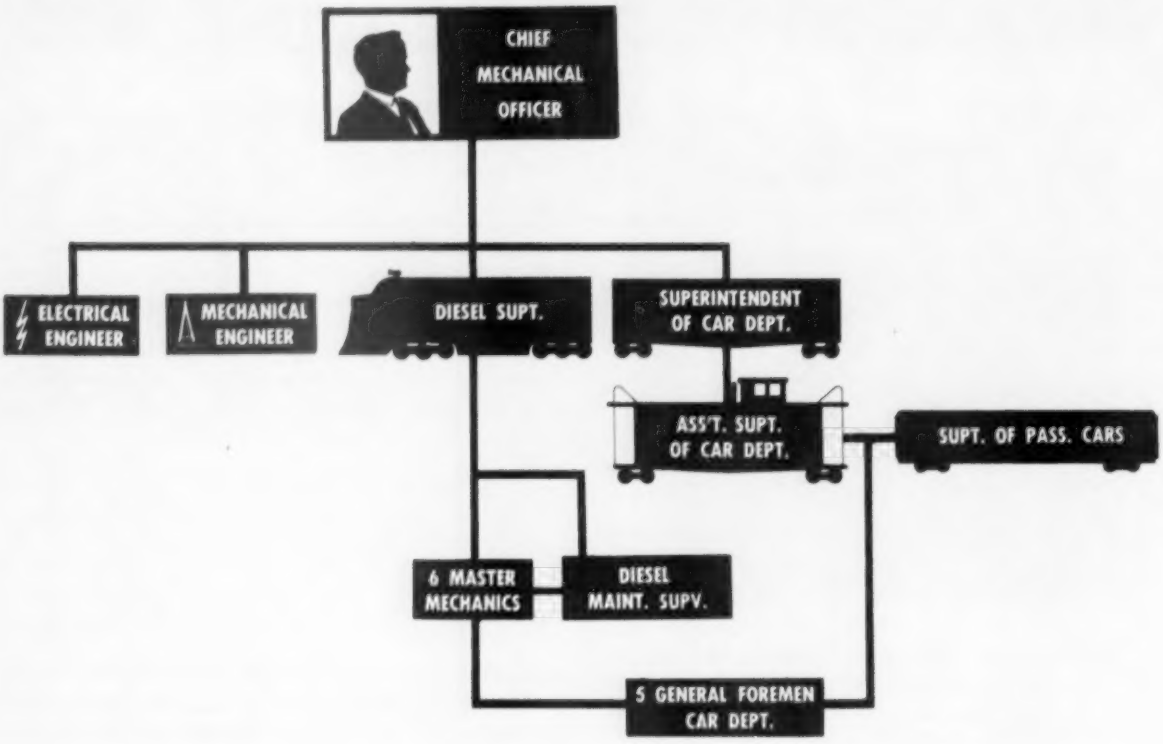
. . . two-way communications . . . (effective) . . .

How effective these methods of two-way communications have proven to be is typified in a recent job our department performed. We were given the task of producing a piece of equipment to be used as a prototype. The problem was explained to the men who would have to build it. The result was that they not only built exactly what we wanted but constructed it for several hundred dollars less than we expected. It was gratifying to us to note that these men were just as interested as we were in saving money while doing a good job.

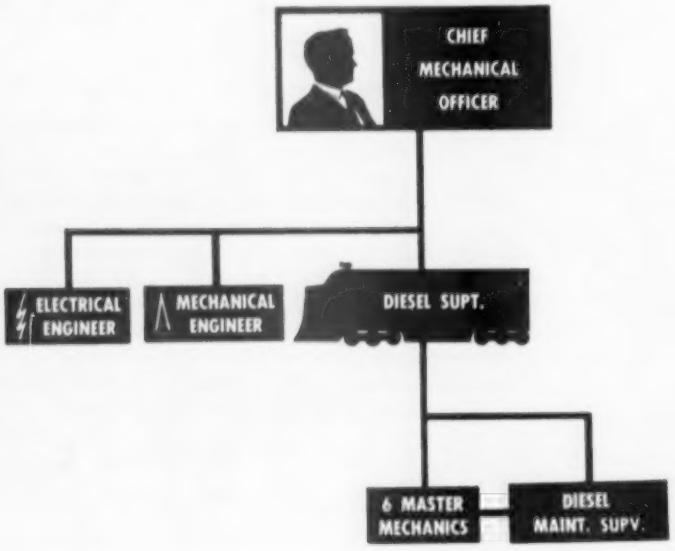
This, then, is what a program such as this can accomplish. We feel that it has worked well on the Frisco.

E. F. Tuck
Chief Mechanical Officer

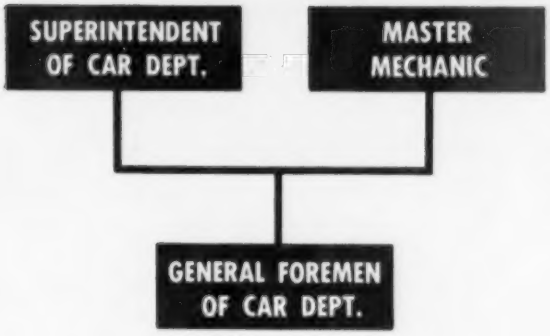
How the Mechanical Department is Organized



No two mechanical departments are organized alike and there are many ways to allocate responsibility and authority. On the Frisco a group of sub-department heads report directly to the CMO. The most striking characteristic of the organization is that the electrical engineer does less than half of his work for the mechanical department. Electrical maintenance matters in the diesel department are under the direction and jurisdiction of the diesel superintendent. The role of the diesel supervisors is to act as an aide, or staff assistant to the master mechanic. The supervisor in each territory also works on any special problems to which he may be assigned by the master mechanic with the approval of the diesel superintendent.



The mechanical engineer and the electrical engineer are essentially staff jobs to render specialized advice when requested. The master mechanic has direct charge of maintenance work on his division. The diesel maintenance supervisor and his staff represent the diesel superintendent



The master mechanic has somewhat broader jurisdiction than is general throughout the railroad industry. He has charge of all mechanical equipment—both car and diesel—in his area and his authority does not end at the back shop as on some roads but includes jurisdiction over heavy repairs. He is in direct charge of car general foremen on routine operating matters while the superintendent of the car department is in general charge of these foremen in regard to policy matters

MAN-POWER AND EQUIPMENT STATISTICS

Equipment handled by the mechanical department includes:

417 diesel units

25,419 freight cars

384 passenger cars

1,649 work service units

446 autos, trucks, etc.

These are handled by:

1,208 locomotive department employees

1,603 car department employees

THE ROLE OF ORGANIZATION is told partly by describing how the mechanical department is built up. Equally important side are the areas where the mechanical department works jointly with other departments and how joint functions are divided.

Joint operations with the test department include, for example, the application of molybdenum di-sulphide on freight car journals to check its benefit in reducing hot boxes. The dry form of this compound is also being considered for application to passenger car diaphragms and truck center plates. Where specialized knowledge is more likely to be found in the lab than in the shop, as for example in luberizing cast iron pistons, a lab man will supervise the entire operation.

Cooperative Shop Layout

Shop design and layout is more of a cooperative venture on the Frisco than on most other lines. The road has an architectural department which is staffed exclusively by architects rather than engineers. It handles all matters relating to the comfort and morale of employees at work, including such innovations to railroading as the installation of wired music in the mechanical department's office headquarters in Springfield. Its functions therefore include not only furnishing and decorations for offices, but the pleasing appearances of shops as well.

The architectural department also makes time studies of operations for laying out shop interiors. It follows the general plan of constructing a building around the area needed for the repair work rather than the reverse procedure of trying to fit a diverse group of repair operations into a pre-conceived floor plan.

"Buy" Mechanical Items

The master mechanic acquires materials from the stores department in much the same way that a customer buys goods at a retail store. Each master mechanic is given a budget and he can use this budget pretty much as he wishes—varying his employment or his material purchases each month as he desires just so he does not exceed his allotment. Individual master mechanics can also trade items, e.g., if Tulsa has an excess of cylinder heads but is short on pinion gears, and the reverse were true at St. Louis, the two points could trade off.

There is no "charge account" equivalent. The master mechanic cannot borrow against next months allowance if he uses up his budget. To help him avoid using up his budgetary allowance too early, the accounting department gives him a statement on the 14th and 21st day of each month telling him how much he has spent to date for material and labor and how much he still has to go. Like any quick estimate, the figures are not accurate to the nearest penny but are within one per cent.

How Costs Are Charged

The Frisco does not keep detailed costs on individual units of either car or diesel equipment. Parts are charged to one of four classes of diesel power—passenger, freight, switch or road-switch—not to any particular locomotive or to a particular builder's locomotive. In car work, cost records are kept by car series.

One of the key methods used in tying the different segments of the mechanical department together—and of tying the mechanical department itself to other departments—is the establishment of effective communications, both sideways between different departments and vertically within any one department such as the mechanical. The mechanical department employs a number of interesting methods to encourage not only the relatively easy communications down the line, but the more difficult to obtain communications from the bottom up.

General Car Department Policy

What the Frisco Thinks About:

Most modernization of plant has occurred in the diesel department and on selected rip tracks. One exception is this up-to-date wheel shop complete with canopy on the entrance track to the demounting press to protect the workers from the rain and cold

- Buying vs Building Cars
- Welded vs Riveted Cars
- Hot Box Prevention
- Speeding Train Inspection
- Priority on New Facilities
- Cycling Cars in Pools
- Locating Passenger Facilities

Because of the Rules of Interchange there is less freedom in the car department to be individual in ideas and practices than there is in the locomotive department. None the less there are many spheres in which the car department of one railroad can and does differ in its operation from that of another. Here are some of the ideas the Frisco has in running its car department.

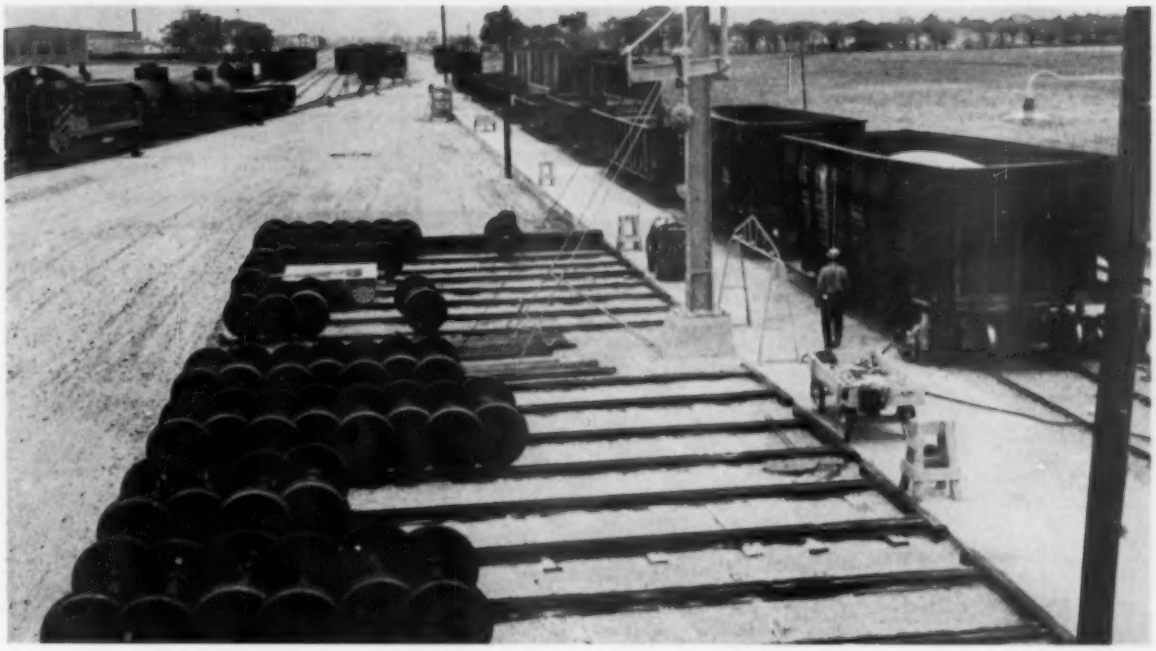
The Frisco classifies freight car repairs three ways—heavy repairs costing over $150, medium repairs costing between $50 and $150 and light repairs costing less than $50. Medium repairs are frequently handled at major rip tracks which handle repairs costing up to about $275.

Heavy repairs are done principally at Springfield (house cars and work service equipment) and Memphis (open top cars) with most of the work done outdoors at both places. Neither facility is well equipped for the work it does. In general, car repair facilities on the Frisco—except for rip tracks as new yards are built—have not been modernized to any great extent although studies are being made to correct this. Studies are also being constantly made of shippers' complaints to eliminate causes of damaged lading in cars undergoing repair.

A special card system is used in classifying cars, and this is done by the mechanical inspector wherever possible as he is better trained to assess the condition of the car as to its ability to handle a given load, e.g., a splintered floor would not hurt a load of refrigerators as much as defective draft gear whereas the reverse would probably be true for a load of flour in sacks.

Loss and damage work is handled by a department headed by a superintendent with three supervisors who work with freight agents in investigating damage and devising ways of preventing it in the future. The mechanical department does not play a very active part in this except to serve primarily as a consultant in matters in which they have the most knowledge and background.

While the Frisco does not build any new cars, the road does an extensive amount of complete rebuilding on the theory that this gives about half the new car life at a fourth the cost



While modernization of heavy repair facilities is still in the planning stage, four rip tracks have received concrete platforms, new buildings shop and lighting

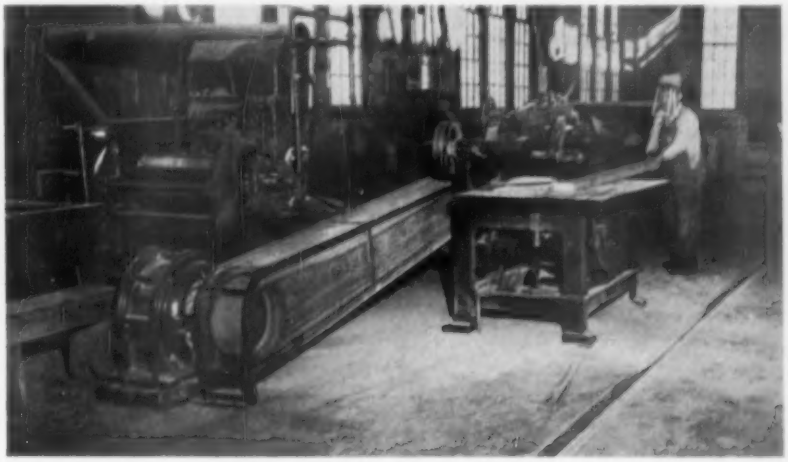
Temporary methods of upgrading cars by the use of paper lining in older cars has proven advantageous in utilizing the older cars for certain types of loading. This work is carried on at the light repair tracks, over the entire system with the greater portion of the work assigned to those areas where this type car can be used.

Fifty new cars with nailable steel flooring were received in 1954 and 265 cars 25 years old were rebuilt and equipped with the ASF ride control package unit.

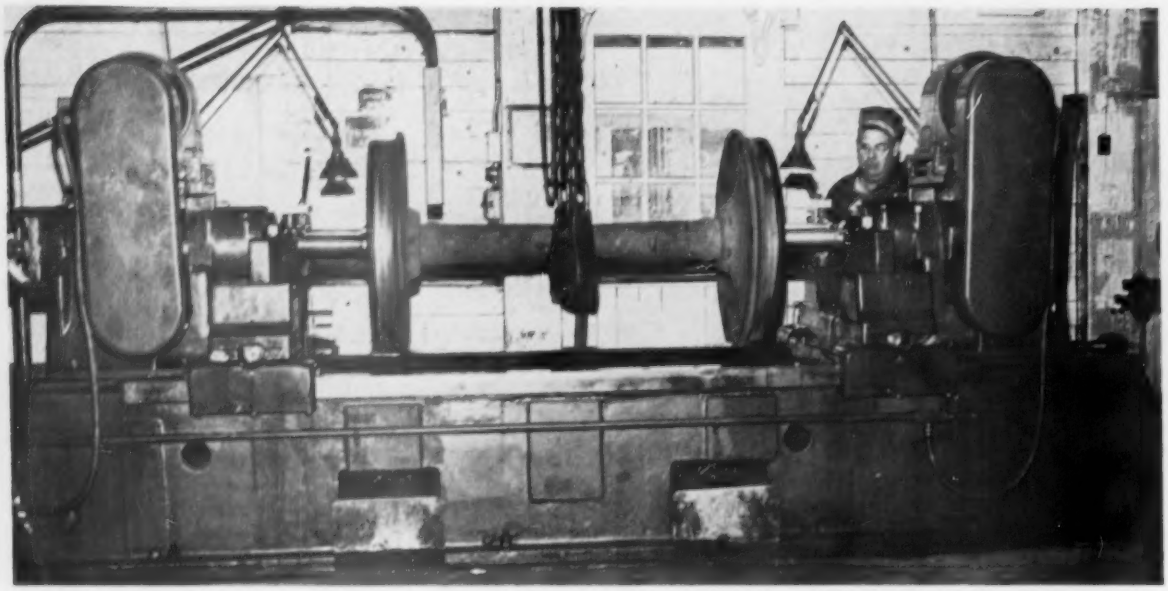
The policy of rebuilding freight cars is popular on the Frisco, which feels that the average rebuild costs about one-fourth as much as a new car and gives at least half as much life (15 or more years vs 25 for a new car). Whether this is all net gain or not is unknown. No maintenance cost comparison has been made between the rebuilt and the new cars because individual cost are not kept on cars; the only figure available is the total maintenance cost per year per average freight car.

The Frisco is not contemplating any new passenger equipment for the near future, and is not interested in the newer designs of lightweight passenger equipment at this time. What interest there is in this type equipment is more from the standpoint of its possibilities for reducing cost than for its possibilities for building up business by improving schedules.

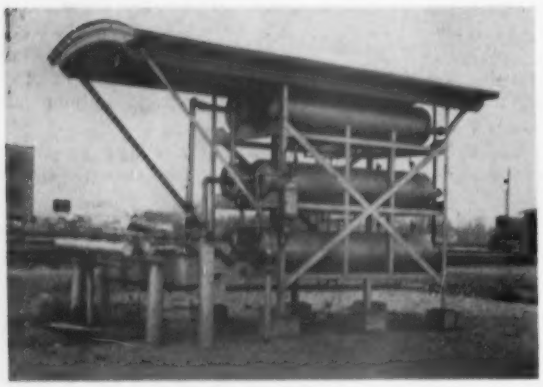
One maintenance practice that is somewhat of an innovation is the overhauling of engine-driven air-conditioning units in the roadway equipment shop (where all shop



Electric motors from locomotive shop machines no longer needed for diesel maintenance are being salvaged to power various car shop machinery that was formerly belt driven



Athough most wheel work has been centralized at Springfield, journal lathes are retained at four rip tracks where more than 15 pairs of journals a day need turning



The Frisco has made wide application of yard chargers to reduce frozen train lines and to cut about in half the time required to charge a train by the locomotive alone

The R-S Journal Stop, developed by the Frisco's mechanical engineer, J. L. Ryan, and now marketed by Magnus, has been applied to 100 box cars after successful trial application on one truck on each of nine ballast cars

trucks are also overhauled). Done every two years, the work is handled in this shop as it is equipped to take care of all work on all off-rail internal combustion equipment from the M/W department and other engines of moderate size.

Less Box Working—Fewer Hot Boxes

At the present time thorough inspections are given to freight trains at major points while minimum inspections (feeling journal box lids, required air tests, etc.) are given at crew change points.

As an additional means of improving operation and building up business, the Frisco, as an experiment, a year ago July ran a train straight through from St. Louis to Ft. Worth (700 miles) with no intermediate attention and had no hot boxes. This experiment was made to check an idea that boxes are over-oiled and overworked, and that a long layover of itself could increase the chance of a hot box by allowing the oil to get cold and thereby reducing the lubrication of the journal.

More Effective Lubrication

One advantage in keeping this servicing time at a minimum or eliminating it altogether at intermediate points would be that the bearings would stay hot and the oil would remain fluid during a short layover. Thus effective lubrication would not have to wait for the cold journals to warm up but would take place as soon as the train started out. The harmful effect of over-oiling was shown in another way. A group of cheese cars were having an undue number of hot boxes leaving Springfield despite extra attention. One reason for the hot boxes was the nature of the movement. These cars stood around for some time awaiting loads. Another was that the cars were cut into a train in which most of the other cars had been

running and the bearings were warmed up. The cheese cars were thus cut cold into a warmed-up train at a point from which a fast start was made.

Filling the boxes to the mouth with oil was not the solution—more hot boxes resulted. It was found that too much oil floated the lint in the waste and allowed it to get under the brass. The hot box problem was solved by eliminating the extra oiling and coating the journals instead with molybdenum-disulphide to provide lubrication until the bearings warmed up and the oil became fluid enough to lubricate properly.

So far the Frisco has not engaged in any of the Insurance Company plans for leasing equipment such as cars or locomotives. However, all types of ideas are being investigated.

Plastics are being investigated for the backs and sides of passenger car seats (everywhere except where the passenger's body is in continuous direct contact.) Fabric would be used where the person sits and where his back rests.

The plastic is expected to be cheaper to buy and apply, to stand abuse better, and to present a better day-to-day appearance as it is washable.

Freight and Passenger Cars Pooled

Borrowing a leaf from the locomotive department's book on cycling and pooling diesel power, the car department has developed a couple of pools of their own. Five passenger car pools centering around three points release an average of 7 head-end and 5 passenger-carrying cars for use per day by reducing lengthy layovers. In some instances the pooling is facilitated by doing passenger-car servicing operations at or near the station instead of some distance away at the freight yards as had been the past practice.

A form of pooling is also employed on some freight car movements. For example, special group of 50 cars were selected to haul lead and zinc ore. This service required cars with good floors and lining to a height of about 5 ft. Cars to meet these qualifications were found to be previously sitting around idle much of the time because of leaky roofs or other defects that rendered them unfit for most commodities but which would not interfere with the lead or zinc ore movement as these commodities were loaded wet. Keeping these cars in this service also eliminates continual cleaning which had to be done before any other commodity could be hauled in one of these cars.

Supplying Coach Steam

Dieselization reduced the requirements for steam and air to the point where it became economical to discontinue stationary plants and install automatic air compressors and steam generators. Where necessary to heat coaches high pressure generators were installed. Otherwise the low pressure type was used.

Dual installations of both generators and compressors were made so that the piece of equipment would be available in the event of a breakdown or failure. Compressors are equipped with starting alternators so that each machine will accumulate about the same amount of wear. To date, 12 stationary plants have been converted to this automatic equipment with some installations paying for themselves in as little as three years time.

The Frisco lets cars go from Class AA down to rough freight only before rebuilding and then rebuilds to AA again rather than to be continually upgrading one or two classifications at a time

Scotchlite is being applied to passenger (and some freight) cars for both safety and advertising purposes. Scotchlite signs are made at Springfield

This chalk mark 10-15 on the corner of the car shows that oiler pool No. 10 did all inspection, packing and oiling work on the 15th of the month. It is one of a series of marks that forms the key to . . .

An Effective Hot Box Control Program

Among the more promising systems for reducing the hot box problem is the one employed by the Frisco on cars leaving St. Louis that:

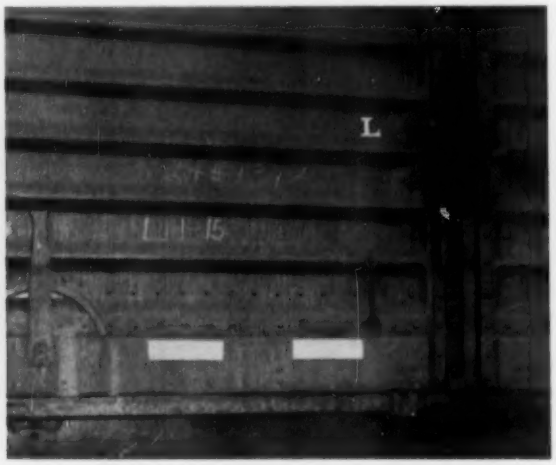
1. Pinpoints responsibility for every hot box whether due to man failure or material failure.
2. Speeds up train inspection by providing a simple means to indicate preliminary inspection work done to cars before being made up into a train.
3. Depends primarily on nothing more complicated than chalk marks and . . .
4. Is therefore simple to administer and supervise . . .
5. Yet does not fail if rain washes the marks off.

The principle of the Frisco system at St. Louis is a group of oiler pools of two men each using a system of chalk marks on different places on the car. In any given pool one man always works the engineer's side of the train, the other man the fireman's side to simplify later checking.

When an oiler completes his work (oiling, adjusting packing, necessary inspection, etc.) on a car on an outbound train he marks his pool number and the date in the corner of the car. Should the car develop a hot box at any place during the remainder of its journey on the Frisco —despite how far that point might be from St. Louis— the symbols will indicate just where the box was packed, by whom and on what date (just the numeral is written for the date as the month is obvious).

Where several pools are assigned to long trains, each

If the car is switched out of the train, pool 10's marks is crossed out and the new pool and new date of inspection written in—again in the corner



In between inspecting made-up trains, the pools do preliminary work on cars yet to be classified and mark their number and date in the center of the car

pool works one block of cars. For example, on a 100-car train there might be four pools, with the first pool taking the first 25 cars, the second pool taking the next 25 cars, etc. By assigning the pools to definite blocks of cars and keeping a record thereof it is possible to determine who oiled a given box that runs hot even if the chalk mark washes off as it often will during rain.

Tracing is of course somewhat more complicated in such instances—but not unduly so. The general car foreman has a "hot box blotter" which shows what pools worked what parts of what trains. When a car is cut out down the line, its position will tell which pool worked it. If the train has been re-classified, the car number is enough to determine (from the consist records) where it was in the original train, and therefore the oiler pool that worked it.

How Inspection is Speeded

When the oilers are not busy inspecting trains, they work cars in the yards bringing the oil level to one inch in the box and any other work that can be done in advance. Such cars are marked by date and pool number *in the center, not the end*. These cars are inspected again after being switched on a train, but the second inspection will of course take less time.

The pool making the final inspection puts its number *on the corner* of the car in addition to the mark in the center. Should the car be switched out of the train the last minute to reduce tonnage or for some other reason, the next pool that gives final inspection draws a line through the corner mark and adds its own. This procedure is followed on all inspected cars switched out of trains, whether they had received preliminary inspection and were center marked or not. The center mark is not crossed out, however, as something may occur later that would make it desirable to know which pool had given the preliminary inspection.

The Human Relations Angle

The personnel at St. Louis yard handles about 14,000 cars a month with an average of four hot boxes a month in the winter and eight to ten in the summer. The program to accomplish this, like any other program, depends largely for its final success or failure on how well it is sold to the men themselves and how hard they try to make it work.

The general foreman at St. Louis feels that this is particularly true in car inspection work because (1) an oiler has to take care of from 400 to 600 boxes per shift in all kinds of weather; and (2) you can't watch a man very much of the time when his range of operation is as large as a car inspector in a big yard.

It is also felt that everyone from the top down must feel that the hot box car be stopped before any program to stop it can be successful. It is also essential that one man is not blamed for the failure of another, and when a failure occurs the man responsible be informed of the specific cause for his future guidance.

The general foreman gives each oiler a copy of the lubrication manual and sees him as often as possible to help clear up any problems he may have. Hot boxes on the road are taken care of by men stationed at major or intermediate terminal. When the dispatcher notifies a man that there is a setout in his territory he makes permanent repairs if possible with the equipment he has, or if the trouble requires more extensive work, like a cut journal, he makes temporary repairs for moving the car to the nearest terminal for changing out the wheels.

Molybdenum-Disulphide ("Molycoat") to cut hot boxes is being tried at some points to see if it will lubricate the journals during the period between the time the train starts and when the oil becomes warm enough to flow and lubricate the bearing surfaces. If the brass is changed, the Molycoat is applied to it; otherwise it is brushed on the sides of the journal

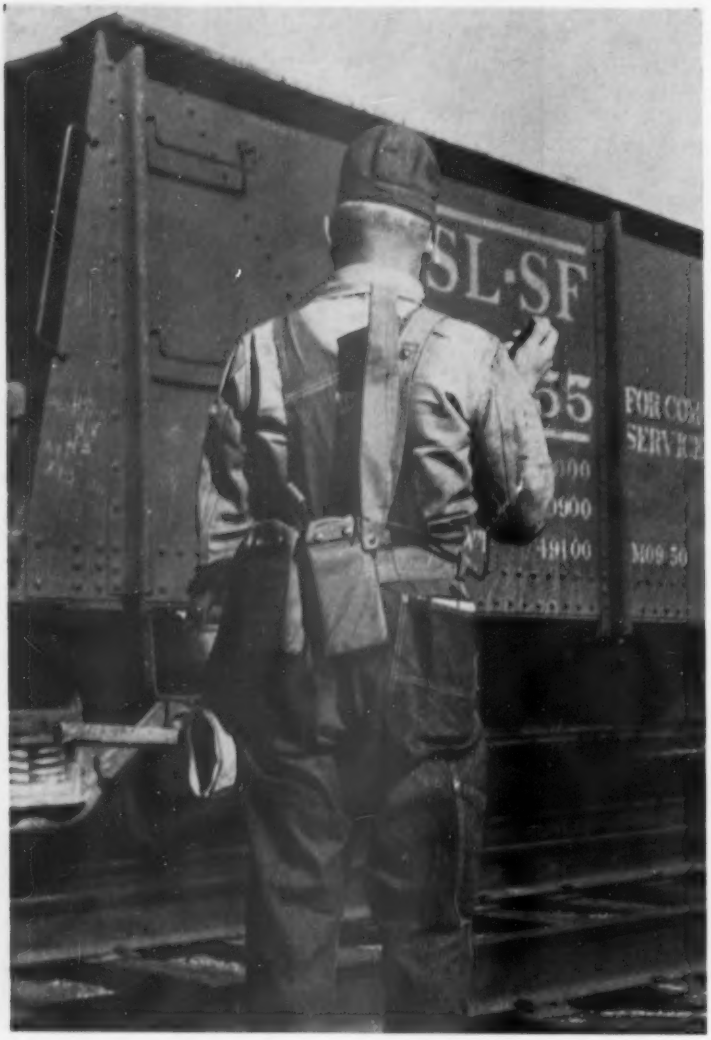
Oiling time on made-up trains is cut to a minimum by a series of strategically located concrete storage bins for oil cans and jacking equipment. The bins are spaced every 250 ft, or five car lengths, along the outbound inspection track. They serve as a point for the oilers to exchange an empty oil can for a full one without stopping to take the time to refill.

The 250-ft spacing was chosen because the two-gallon cans hold enough oil for about one side of five cars. Thus the oiler passes one of the boxes at just about the time that his oil can becomes empty. He leaves the empty can in the box and takes out a full one, oils the next five cars, repeats the exchange, and continues this procedure until all journal boxes have been oiled. The empty cans which were left in the bins are filled between trains when the oilers have time to spare.

The boxes are 2 ft wide, 2½ ft deep and 4 ft long. They hold ten oil cans, a journal jack, wheel iron and jacking blocks. A two-part steel cover is hinged in the center and is painted yellow for night visibility. The cans are filled from 8,000-gal tanks at each end of the yard.

Concrete storage bins are located every five car lengths to exchange empty oil cans for full ones

Car Inspection Aided by Novel Use of Radio



1 Instead of walking up to a couple of dozen car lengths to reach a telephone to report a defect, the car inspector can now speak into a portable microphone and his message will be reproduced on . . .

Car inspection is expedited by a novel communication system developed by the Frisco and installed at yards in Springfield, Tulsa, St. Louis & Memphis.

Each car inspector is equipped with a light-weight portable radio transmitter set (nick-named "Dick Tracy" sets), which he carries with him as he makes his inspection of a train. If he finds a defect on a car, he speaks into the microphone, and his message is transmitted by radio to a fixed radio receiving station. The message is then reproduced on paging-type loudspeakers. At Springfield, for example, there are 27 speakers on poles at various locations in the yard and five are in offices, one of these being in the car foreman's office. Thus, this statement is heard not only by the car foreman but also by the other car inspectors working on the train and other men who are interested. When the foreman hears an incoming statement concerning a defect on a car he speaks into the microphone on his desk and his statement is broadcast on all the fixed loudspeakers in the other four offices and at the 27 poles throughout the yard.

Under the previous method, when an inspector had completed his job, he had to walk, perhaps half the length of the yard, to reach a telephone to report bad order cars to his foreman. As three or four inspectors usually worked a train, the foreman had to wait until all men had phoned in before he could call the yardmaster with the list of defective cars. With the new communication system, all the inspectors working on a train report defects when they find them, and then report when they finish their work on the train. Thus, the foreman can phone his list to the yardmaster at once—the new communication system saves a lot of time.

Adds to Both Safety and Speed

The new system also has a safety feature. Should an inspector spot a defect that he can remedy himself, he simply announces over the microphone that he is going to work on a particular car. Locomotive crews and other inspectors in the area hear the warning as it comes out over the paging horns. This eliminates the time wasted by an inspector in having to walk to the end of the train to set up a blue flag. Instead he merely calls to an inspector at each end of the train asking him to set the flag in place. When the inspector gets an acknowledg-

ment that both ends of the train are blue-flagged, he can go ahead with his work—assured that he has blue-flag protection.

Radio is also an aid in making the terminal test when a train is ready to move. Where the locomotive and caboose are so equipped, however, the regular train radio is used instead of the small portable transmitters. The regular radio is preferred as the messages are broadcast directly inside the caboose or locomotive cab rather than outside on the pole-mounted loudspeakers, which makes it easier for the inspector in the caboose and the man in the cab to hear each other.

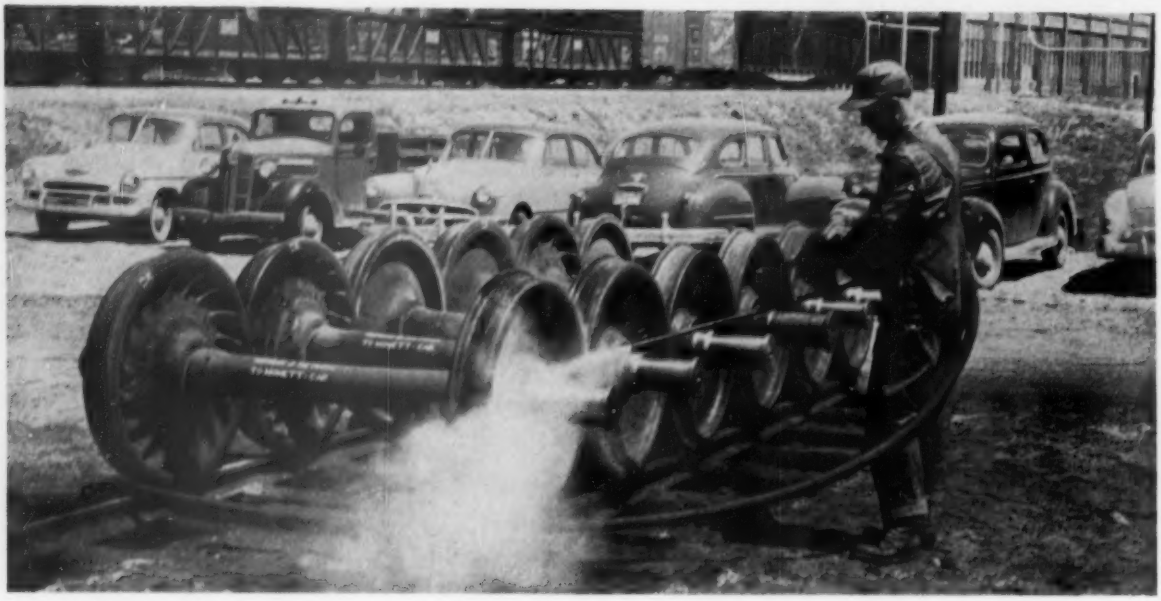
The radio used by each car inspector is enclosed in a canvas pouch, and the batteries are in a second similar pouch. The two pouches are attached to the inspector's belt with a shoulder strap, as shown in one picture. A flexible wire connection extends from the radio set to the small palm-type microphone, which can normally be carried in the man's pocket.

Range Over A Mile

These small radio transmitters operate on a separate frequency, so that they do not interfere with the other yard radio. The power output is 0.1 watt. The range of a transmitter is approximately a mile from the base station (which picks up the message and transmits it to the office speakers and to the 27 outdoor loud speakers). Thus the system is adaptable to any size yard. The dry-type batteries to operate the radio transmitter have no rated life, but the Frisco's experience is that the "A" battery lasts about 30 days and the "B" battery about 60 days.

2 Loudspeakers mounted on 27 poles at various locations in the yard and five in the . . .

3 Offices—Where microphones permit the car foreman and other yard supervisors to speak also into the 27 loudspeakers

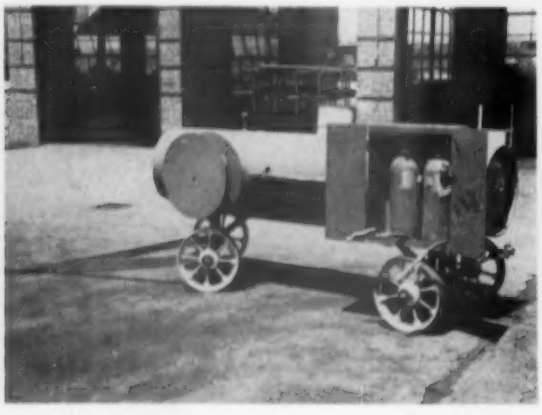


Wheels are steam-cleaned before turning journals to avoid fouling up the cutting tools and burnishing rollers and for better inspection of the plates

Arrangement for transferring a wheel set between tracks is made of heavy tubing. Wedges roll the wheels on ball bearing dollies while stops on the far end line up the wheel set for unloading on the adjacent track

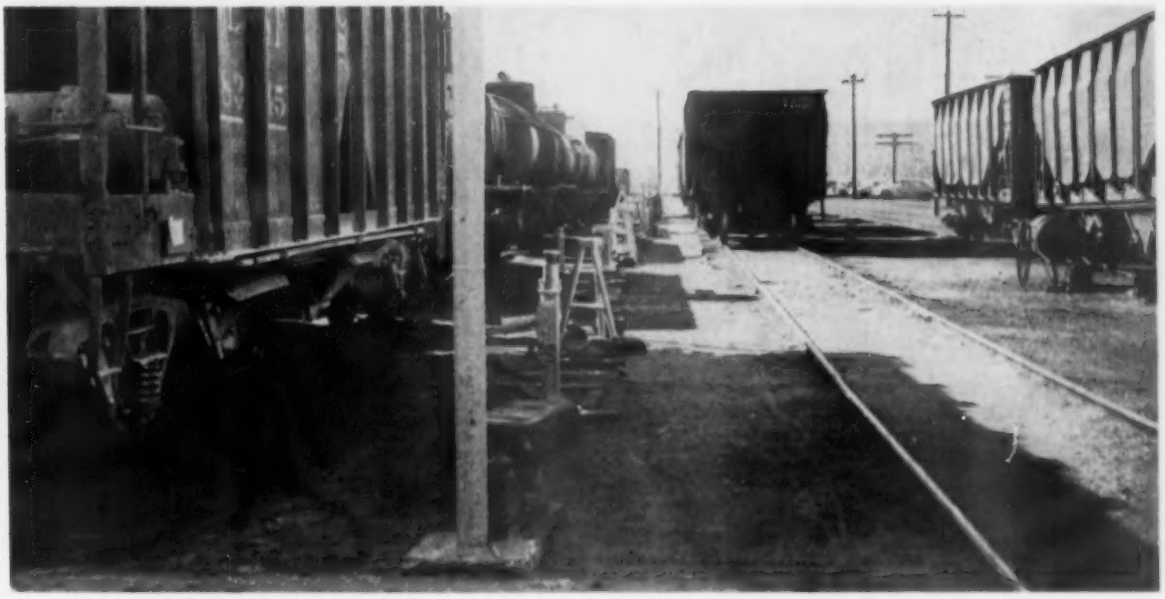
Rip Track Operations

The Frisco keeps rip tracks clean and neat to a degree not commonly found on the theory that neat surroundings have a psychological effect on causing a man to want to do higher quality work. All concreted rip tracks are swept several times a day with power sweepers. Several points paint work equipment (jacks, stands, A-frames, etc.) bright yellow so that it is evident, even from a distance, whether or not these items are being stored neatly and safely.



All major rip tracks have a fire-fighting wagon equipped with both fog nozzle and dry extinguishers

Truck-hauled trailer with built-in jack for changing out a pair of wheels on the road



Painting jacks, tripods and other rip track equipment bright yellow makes it easy to see whether they are stored neatly in a straight line midway between tracks

Highway movement of mounted wheel sets for emergency changes out on the road will be tried with a truck hauling a trailer. The wheel set will be raised and "snugged" into position by a jack against a pair of concave supports shaped to the tread contour. The lifting jack is built into the trailer and the chains which wrap around the axle are fastened to a mounting fixture on the end of the shaft.

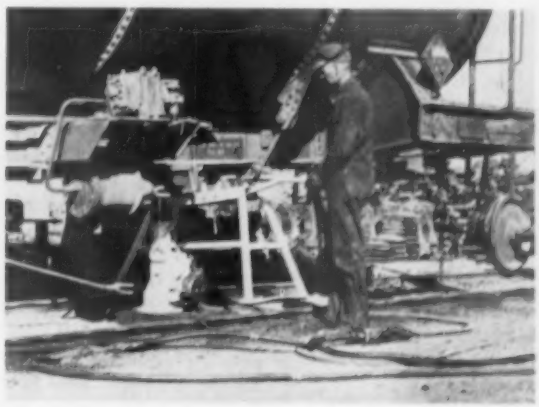
To protect rip track areas by putting out small fires quickly before they become big ones, four-wheel fire fighting wagons are being installed at the larger points. These can be pulled along the concrete runway either by the workmen or by a shop truck. They extinguish the blaze either by fog nozzles or by dry extinguishers.

The wagons carry 275 gal. of water (a seven-minute supply), two CO_2 dry extinguishers, two axes, and two reels, each with 50 ft. of 1-in. hose. The wagons are charged with air for water delivery from one of the rip track outlets. Anti-freeze (calcium chloride or similar solution) is added to the water during the winter to permit storage outdoors.

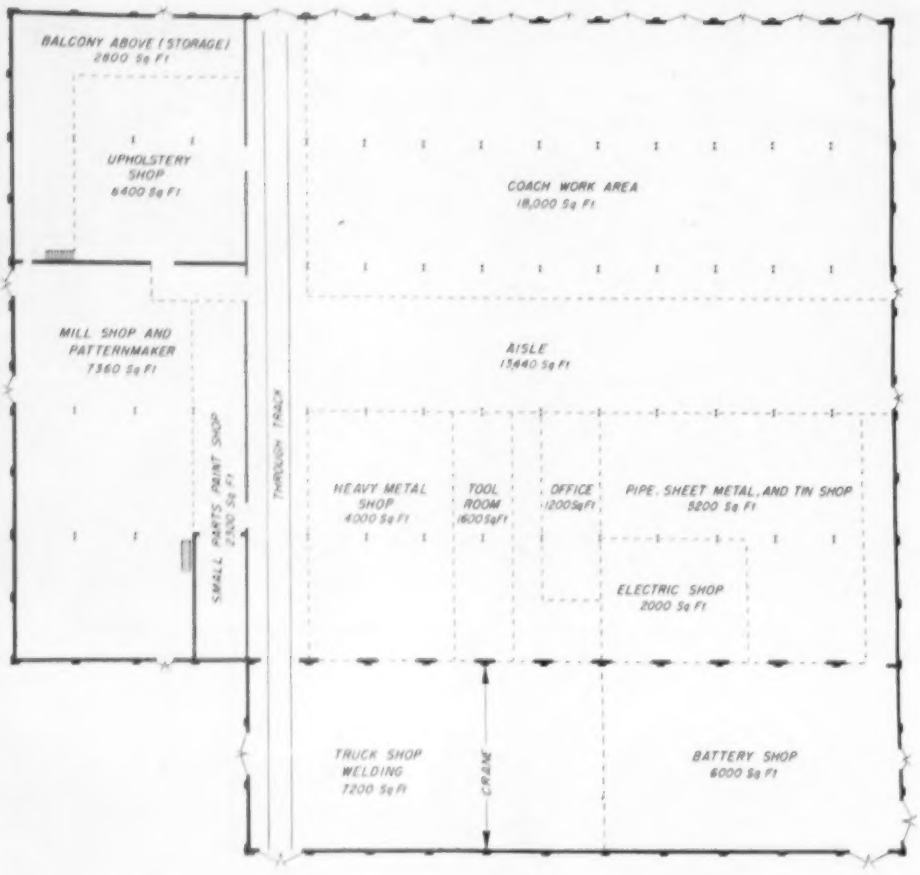
The Frisco has also found it to be a worthwhile practice to remove the grease, oil and road dirt from the wheel plates on used mounted car wheels before turning journals. The cleaning takes about a minute a wheel and is done by a steam gun.

Two principal advantages result from removal of this accumulation: (1) elimination of fouled up cutting tools and burnishing rollers of axle lathes, which would otherwise be caused by this accumulation falling off while the journals were being turned; and (2) better inspection of the plates of the wheels for cracks or other defects.

Concreted rip tracks—which are installed at Springfield, St. Louis, Kansas City and Wichita—are kept clean by power sweepers



Welding handles on a conventional trestle makes it easy to carry about and simplifies putting it under the car



Two plans were studied to modernize coach repair facilities—one to change the present shop to look like this

Coach Needs Analyzed

Two plans were studied to improve coach repair facilities. Initially, both depended principally on the reduction of material handling for the improvement they would be expected to effect. A substantial revision of the present layout would reduce such handling by 43 per cent, while moving the coach repair operations to the former steam locomotive erecting shop would make for a 55% reduction.

One of the main factors in reducing the material handling requirements is the reduction in either plan of the area available for coach repairs. Revising the present shop would reduce this area to about half of what it is now. The alternative plan for taking over the former steam erecting shop would reduce the area for coach repairs somewhat less than this.

The reduction in coach repair area will result in the repair time to the average coach being reduced partially because the smaller area will reduce material handling requirements and consequently man-hours to complete the repair and partially because of other improvements in efficiency resulting from the modernization. A final gain that is expected is an improvement in the availability of the more modern equipment because of the lesser time that it will spend in the shop when due for repair.

Revising the layout of the present shop is the simpler job of the two plans. The principal change from the present layout is in the area to the right of the through track and below the aisle. This is now occupied by a series of tracks for coach work. These tracks would be eliminated in favor of the shop, tool room and office areas shown on the drawing.

With this plan one building and part of another where coach work is currently being done could be eliminated. All coach shop operations would be in one place, and all operations under any one foreman would be in the one area. The general foreman's office would be in the approximate center of the shop—resting on 40-in. stilts and completely glass enclosed to make the entire shop easily visible.

The upholstery area would be increased some 2½ times to permit a revision in present seat renovation practice. The new plan would be to have seats reconditioned in advance as this work is now often the operation that delays the car. The increased area can be used to store seats so reconditioned in advance. To keep a steadier load on the upholsterers, it is also planned to catch up on seat work when head-end cars are going through the shop.

The advantages of centralization of supervision, consolidation of work into fewer buildings and shop sizes proportional to work load would also apply to a second alternative—taking over part of a former steam shop. This plan would also offer some additional advantages

but at a cost of about half again as much as revising the present coach shop.

Moving into the old locomotive shop would eliminate four buildings (at least two more than the other plan), and it would bring under the one roof the air brake room and machine shop, which would be separate under the other plan.

Assembly Line Truck Work

The use of the locomotive shop would permit taking advantage of its crane facilities for better material handling. While the overhead traveling cranes could not be used for lifting the car body, the No. 1 crane (two of 10-ton capacity) would improve the efficiency of carrying the trucks to and from the repair area. It would also be useful to handle upholstery and storage items between the main floor and the balcony. The No. 2 crane would move heavier materials (actually the No. 2 crane is three cranes of 15-ton, 100-ton and 250-ton capacities).

The procedure intended to be used for removing trucks would be to raise the car on four jacks and roll both out toward the center aisle. The trucks would then be carried to and from the truck shop by the No. 1 crane. This would save pushing the truck from the shop to the transfer table and a move of the table. Truck overhaul operations will be on an assembly-line basis with three tracks planned for the work.

Other advantages of using the former steam locomotive shop are that it offers a potential of 25 tracks and a more compact arrangement for heavy repairs to diesel and coach bodies. Wreck damage work on diesels would continue to be done in the coach work area because this is equipped with tie-down rings to straighten bent frames.

Originally it was planned to move the traveling paint spray booth to tracks 1, 2 and 3. This idea was later changed after additional study however, as the move would be quite expensive to make and there would be no appreciable simplification of procedure. Movement of the car between the repair area and the painting area would require the use of the transfer table as it does now because the crane facilities are such that the car body could not be lifted between the two areas.

Where the coach shop has but 20-ft track centers and has supporting columns between the tracks, the locomotive shop has 22-ft centers and no obstructing columns. Further, none would have to be erected as the locomotive shop conversion would employ portable scaffolding.

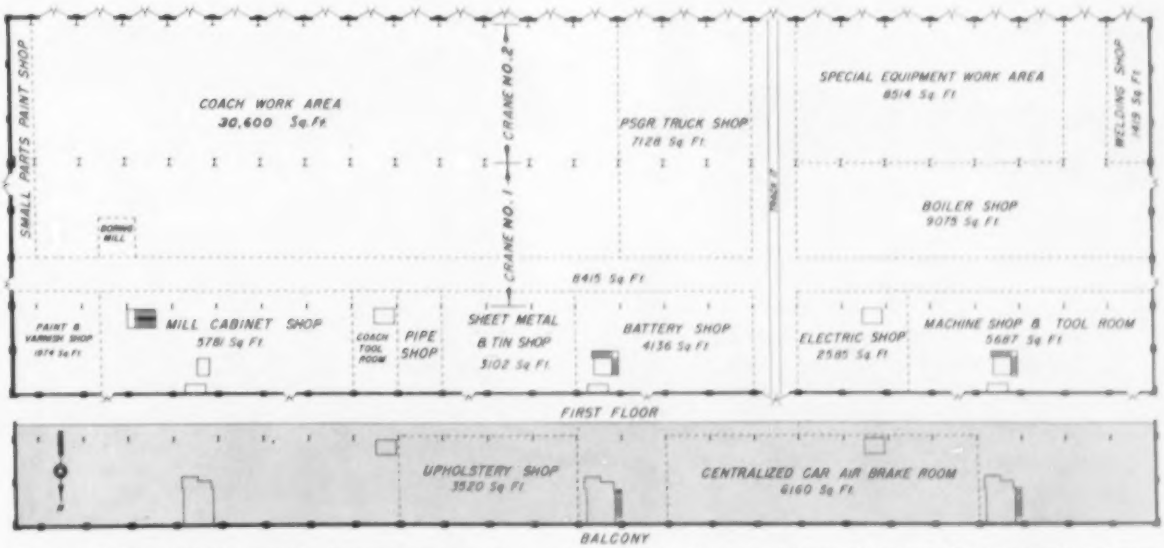
The locomotive shop is floored entirely with concrete whereas the coach shop has wooden planking for most of its floors. The locomotive shop also offers the shortest route to and from the blacksmith shop and the stores building.

The output of a shop under either plan would be four heavy and eight light repairs per month, which is sufficient to give Frisco passenger equipment a light repair every two years and a heavy repair every four years.

SPACE AVAILABLE FOR DIFFERENT OPERATIONS UNDER THE TWO COACH SHOP PLANS

Operation	Area by Revising Present Shop, sq ft	Area by taking over locomotive shop, sq ft
Coach Work	18,000	23,760
Truck Shop	7,200	7,128
Sheet Metal	5,200	4,136
Mill Work	7,360	5,781
Battery Shop	6,000	4,136
Electric Shop	2,000	2,585
Upholstery Shop	6,400	3,520
Heavy Metal Shop	4,000	9,075
Small Parts Painting	2,300	1,974
Carbody Painting	*	6,840
Air Brake Room	*	6,160
Machine Shop	*	5,687

* Would be done in another building



The second plan would take over the former steam locomotive erecting shop. It is the more elaborate of the two plans and would cost more, but would result in a more efficient operation

The Car Man's Role in Damage Prevention

In addition to its consulting role in supplying technical knowledge where needed to solve damage prevention problems, the car department plays an active part in selecting the right car for the lading. The selection is made by the mechanical inspector with the aid of a series of small car classification cards.

The card telling the commodity for which the car is suitable is applied by the mechanical inspector either in the classification yard or on the rip track. It stays with the car until it is unloaded, at which time the agent removes and files the card. If the lading carried in the car should later turn out to have been damaged as a result of a mechanical defect in the car, the card can be removed from the file to tell who erred in classifying the car.

Action taken when a car has been misclassified is essentially educational rather than punitive in nature for two reasons—(1) the work is often done under adverse conditions, such as darkness, cold, rain, etc., and (2) a tough policy would tempt an inspector to be ultra-conservative in grading cars as he would have everything to gain and nothing to lose. The final result would, of course, be that better cars than needed would be furnished for many loadings, and there would be a shortage of cars marked satisfactory for commodities requiring higher grade cars.

Two Classes Per Card

The cards used for classifying cars are a standard form 3 in. by 4 in. and most have one classification on one side and another on the reverse side. The printing is in black except for the classifying letter which is in green. In some cases there is a relationship between the two sides, as the *A* and *AA* for box cars. In others, the classification on one side may be for a different type car than that on the other side, as *D* and *E*.

Altogether there are six different card forms covering nine letter classifications. Four cards have letter classes on both sides. A fifth, marked *P* for pipes, logs, poles and piping, is marked on one side only. The sixth card is marked *F* on one side for lading not covered by one of the other cards and the name of the commodity is written in.

Training Its Men

The Frisco is training-minded and has programs tailored to various levels from apprentice to top management.

More than most roads, the Frisco sends men around to visit other shops to see first hand how jobs are being done instead of being told how by traveling instructors

Personnel training on the Frisco is carried on at all employee levels right up to a 90-day course at Harvard for top management. This course gives a thorough all-around training in traffic, finance, business administration and personnel relations, and is not departmental in any sense.

Outstanding prospects for future promotion to top management posts are sent to an intensive course at the American University in Washington, D. C. The course runs 9 hours a day for 30 days and is complete in transportation, including financing. It, like the longer Harvard course, is not departmental in any sense, although it is attended largely by departmental officers. Included in the curriculum are lectures by outside experts and four field trips to such points as Potomac yard, Washington airport, Washington terminal, the B&O shops in Baltimore, the Baltimore wharf and dock facilities and the headquarters of the I.C.C.

Mechanical department personnel also attend Dale Carnegie courses in public speaking and human relations along with members of other departments. These courses are held at different points on the Frisco and are given to groups of approximately 40 which comprise all levels of employment from laborer to vice-president. The course runs for 16 weeks and has one four-hour meeting each week. It is conducted on the employees' own time but the entire cost is financed by the railroad.

There are two diesel clubs composed of Frisco employees only, one at Tulsa and one at Springfield. These are run entirely by the members but the railroad does

help out with such things as providing special equipment (movies, projectors, data, etc.). The line also helps to get speakers and sometimes contributes toward minor expenditures. Only hourly rated men may hold office in these clubs which are open to shop men and road crews.

Apprenticeship Training

The Frisco has three types of apprenticeships—a 2-year special apprenticeship, a three-year helper apprenticeship and a four-year regular apprenticeship. Special apprentices must be between the ages of 20 and 26 and be engineering college graduates; regular apprentices must be between 16 and 24; helper apprentices are between 21 and 35 and must have served two years in their repective craft before hiring on as a helper apprentice. Currently there are 84 regular apprenticeships, 7 helper and 3 special apprentices. Helpers are no longer being upgraded.

When a regular apprentice is hired he is first taken on a tour through the shop where the work of the various crafts is explained and shown to him. At the conclusion of the tour a discussion is held with the prospect to find out what craft he would prefer and would be best qualified for. If hired, the regular apprentice serves eight periods of 130 eight-hour days. Helper apprentices serve six periods of 130 eight-hour days and special apprentices four periods of 130 eight-hour days. Regular and helper apprentices are hired by the master mechanic having jurisdiction.

Broad Special Apprentice Course

Special apprentices are screened more thoroughly and are hired by the chief mechanical officer. A correspondence course is encouraged but not required from apprentices. At times the apprentices also attend some night courses in state schools that are helpful to their craft. The Frisco is currently setting up a blueprint reading course to be taught by the assistant mechanical engineer at which mechanics will also be encouraged to attend.

The special apprentice does the work of all crafts during his two-year period and then gets the choice of any craft at which he works one day to establish his seniority as a journeyman. The special apprentice then spends 60 days divided among other departments (traffic, transportation, engineering, signalling, personnel and accounting) to give him a rounded viewpoint of the overall railroad operation. Following this he normally has four choices of where to start his career—the car department, the diesel department, the mechanical or the electrical engineer's staff.

One aspect of personnel training which distinguishes the program of the Frisco mechanical department somewhat from that followed by most roads is the value placed on visiting shops. More than on most roads, men from one shop get a chance to visit another, particularly the main shop at Springfield. By doing this instead of sending instructors around, the men can see at first hand how jobs are bing done at points other than where they are stationed.

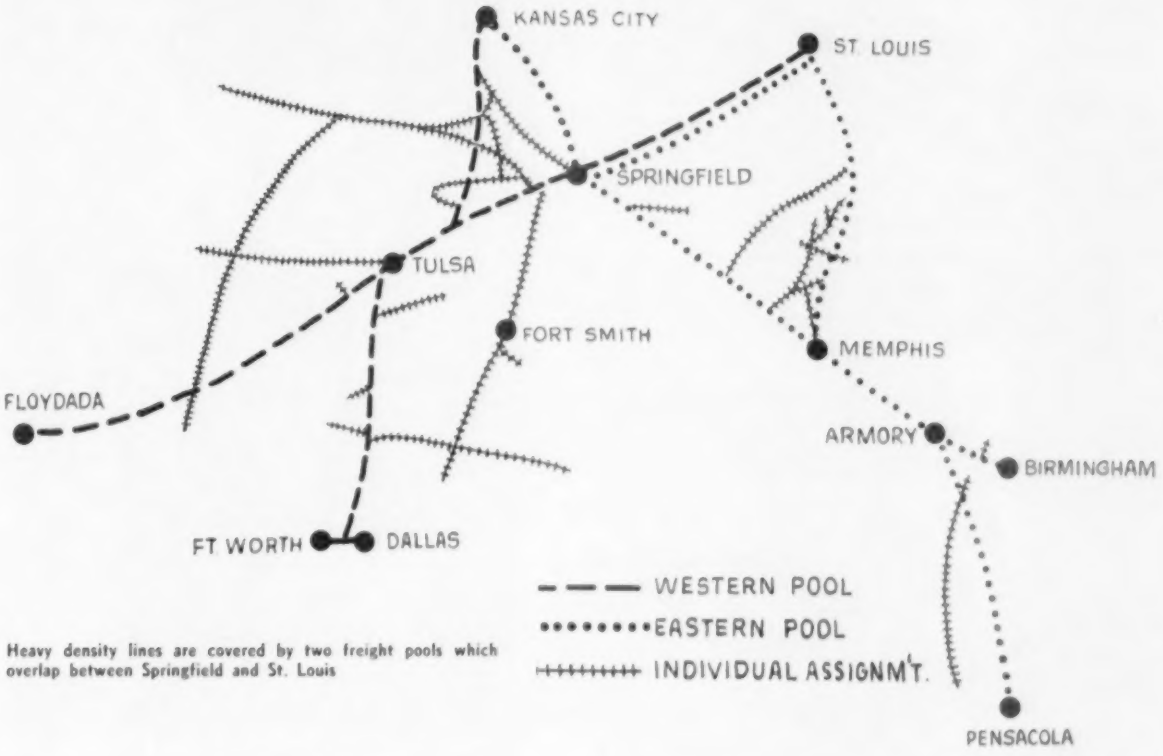
This procedure has also been found helpful in more respects than just teaching the men how to do given jobs. For example, if a supervisor is not keeping his shop as clean as is thought he should be, he may be sent to another shop where good housekeeping does prevail to show him what can and is being done.

This on-the-spot observation of work is supplemented by general training with an instruction car that visits major points. Instruction on this car is given both by Frisco men and by representatives of the locomotive builders. The program of sending men to schools at the locomotive builder's plant has just about been completed as most supervisors have already completed one or more of these. These men are thus in a position to impart their knowledge to the men under and around them, and the Frisco prefers to train their men in their own shops anyway.

To prepare men to solve problems that are still largely in the future, outside schools are still employed. For example, three diesel supervisors are currently attending a school for freight car mechanical refrigeration. What they learn at this school, plus literature from it, will be used to teach mechanics and apprentices who will handle this equipment.

These trips can also be used for other purposes—such as to hint at better housekeeping by having a man visit an unusually neat shop like the above

Facilities and Operating Pools



Heavy density lines are covered by two freight pools which overlap between Springfield and St. Louis

Being an X-shaped railroad, the Frisco centers its operations and maintenance about Springfield. All units get heavy overhauls, and nearly half are maintained there, including the 108 assigned to the two freight pools.

All passenger power (23 road-type units and 12 road-switchers) is assigned to pools, with half maintained at St. Louis and half at Tulsa.

The actual number of units in the two precision freight pools will vary somewhat according to traffic volume. In general, trains handled by pool locomotives are the more important time freights and are overpowered, with the number of units assigned to a given size train determined by ability to make the schedule rather than by tonnage rating.

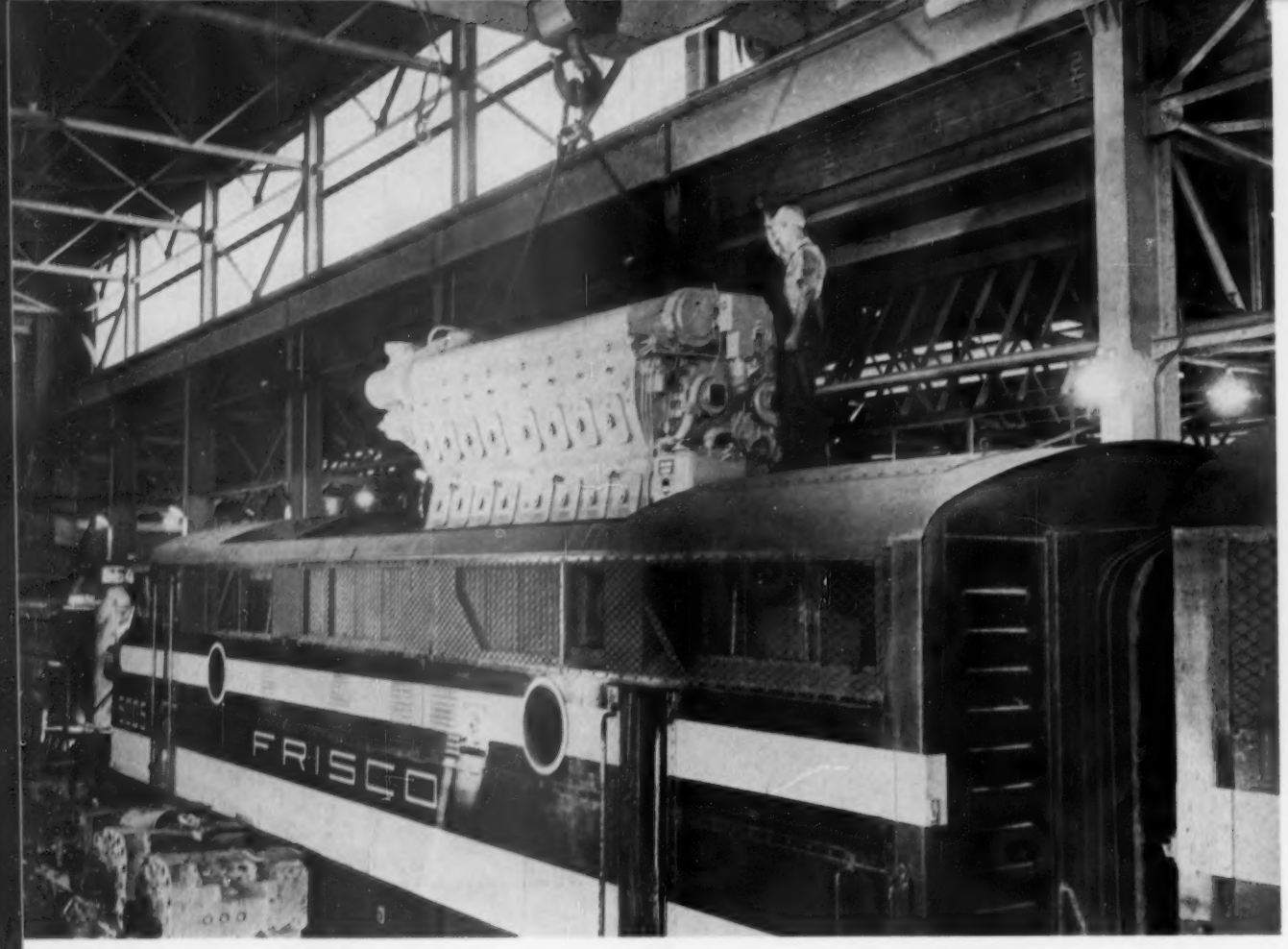
Thus, if an unexpected heavy job is required on a unit of a pool locomotive, it can be cut out and the locomotive run one unit short without serious effect on the schedule. Normally a spare unit would be available to put in its place or tonnage would be reduced.

Approximately 170 road and general-purpose type units are not in the precision freight pools. These are considered extra power and are shifted around to meet variations in local traffic volumes. The movements are made by the transportation department after conferring with the mechanical department to coordinate train assignments with scheduled maintenance needs.

This extra power is not centrally assigned as on some roads. Except for the movement of power between divisions and into maintenance terminals for mileage scheduled inspection, assignments to particular runs within a district are made locally.

Principal mileage maintenance points are: Springfield (179 units), Tulsa (76), Fort Smith (54), Amory (58), and St. Louis (50).

Units are cut in and out of locomotives to match train tonnage with no attempt made to keep given combinations of units together nor to keep road units segregated from all purpose units



General Diesel Policy—

Cranes from 15 to 160 tons are being dieselized. Savings on fuel are a dollar an hour on 30-ton models like the one above

What The Frisco Thinks About—

- Frequency of heavy repairs
- Economics of unit exchange
- Flashover prevention
- Relationship of truck and engine repairs
- Inspection methods
- Personnel training
- Remedying road failures

While the Frisco does not have any diesel practices which might be termed radically different from other roads, it does follow a number of ideas which vary at least in degree from what most lines are doing. One major group of these ideas concerns unit exchange. The Frisco employs this practice more extensively than most roads of its size especially on large items of electrical equipment and it plans to continue to do so in the future.

Why the Frisco uses unit exchange rather extensively

is exemplified by the thinking on traction motors. They follow a thorough program of servicing and light maintenance, but get all complete overhaul through the medium of unit exchange. The Frisco has four main reasons for this practice: (1) It would cost about $585,000 for a traction motor shop capable of meeting a peak need up to 25 traction motor and about six main generator overhauls per month although average needs would only be about 40% of this; (2) it would require an inventory of about 35 more traction motors at $6,000 each; (3) traction motors would only be maintained in kind and not upgraded as is currently done by the manufacturer in unit exchange; (4) and finally the line feels that present operation is satisfactory with less than 100 unit exchange motors required in an average year and about 200 in peak years of major repairs.

Motor Mileage and Cost

Traction motors are sent for unit exchange after six years on switchers and 600,000 miles on freight and passenger units. In general, bearings are the limiting factor on passenger motor life, insulation and bearings on freight traction motors.

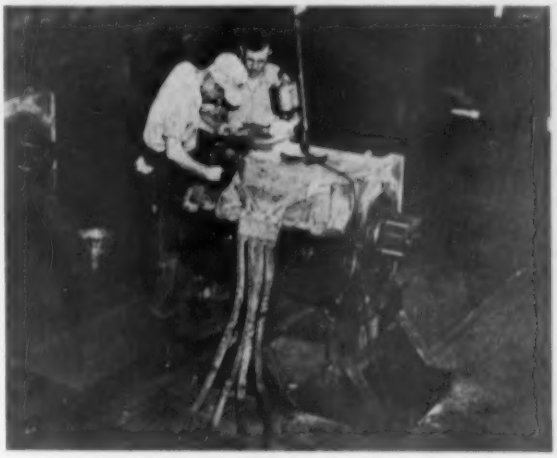
A study is currently being conducted to determine whether it would be economical to increase the exchange mileage on passenger traction motors to 750,000 miles. The test is being conducted by gradually increasing the motor mileage in small increments to see how far this mileage can be extended before either an appreciable number of bearings might be expected to fail or where perhaps insulation would limit the mileage in passenger service as it now does in freight service. The chief consideration in the study is to see that the extra 10 to 25 per cent of mileage does not deteriorate the insulation to the point where it cannot be saved and thereby approximately triple the normal $475 cost of unit exchange to the $1,425 it would cost for a rewind.

Truck and traction motor repair periods are completely independent of engine, body and auxiliary repairs. Truck and traction motor work is scheduled on a mileage basis to coincide with wheel turnings. This averages slightly over 87,000 miles on freight units, and 91,000 miles on passenger units. At this time, the traction motors are blown out and thoroughly cleaned, with the commutator checked by dial indicator and jig stoned if necessary. Before leaving the shop and being returned to service it must run within .001 inch out of round.

The risers have any old paint removed by sanding and are painted with a fast drying insulating enamel. The bearings are checked with a listening rod while driven by a welder at three different speeds—200, 1,000 and 1,800 rpm. If the bearings are considered unsatisfactory for further service, and the motor has over 400,000 miles on it, it is sent for unit exchange. If it has less than 400,000 miles, the Frisco puts in new armature bearings. The new type non-asphaltic base greases, such as Sinclair Jet Lube, Conoco Cogrease, and Texaco Geartac RR, are used in all traction motor gear cases, both the new tight-type gear cases and the original style.

In between these light overhauls given to traction motors each time the truck requires work, the motors are blown out and a complete visual inspection is made. This is done every 5,000 miles on road power and every month on switchers.

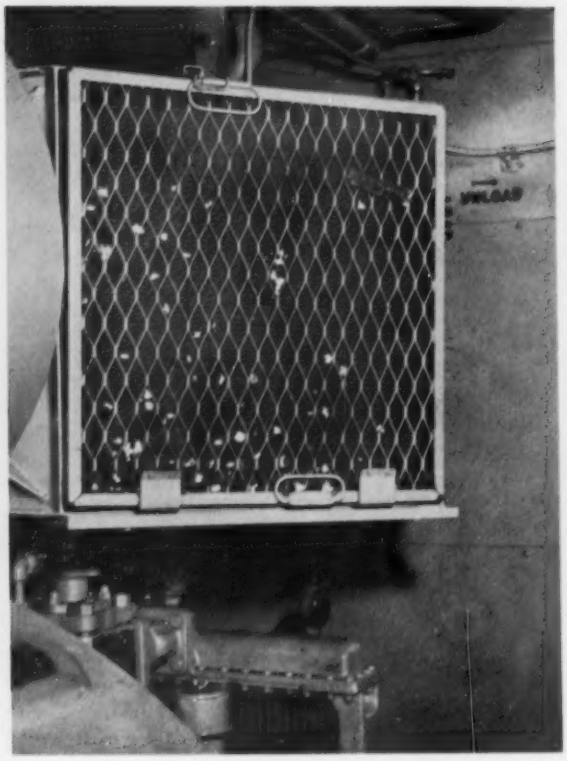
While traction motor maintenance is closely coordinated with truck maintenance and largely dependent on wheel work requirements, neither is correlated with engine repair requirements



Every time wheels are changed out (unless at very low mileage from flat spots or other defect) the traction motors receive a complete inspection and minor work as necessary to bring them to new motor tolerance

Entire freight trucks rather than individual wheel sets are normally changed out at Springfield to simplify keeping wheel sizes matched The same is true of passenger trucks at St. Louis and Tulsa. At other points only the defective pair is exchanged on freight and switch power as the other practice would require too many spare trucks at the smaller points

A diesel records department relieves mechanical supervision of all clerical work involved in keeping track of mileage and inspection work due



Rather than depend on getting the dirt out of EMD main generators by corn cob blast or other means, the Frisco developed a filter arrangement to catch the oil vapors and keep dirt that does enter dry

Freight trucks are rebuilt about every 87,000 miles (which is the average freight wheel life). Normally by this mileage, at least one pair of wheels needs replacement.

Generally as the one pair comes due for replacement, the second is close to needing it. A similar situation prevails on passenger trucks. When one pair of wheels needs replacement at an average of 91,000 miles, the second and third are not far behind. Therefore, the Frisco's usual practice is to change out the entire truck at whatever mileage the first pair of wheels needs attention, and to do it at the point at which the unit is maintained—Springfield for freight units, St. Louis or Tulsa for passenger power. This practice also fits in well with the traction motor maintenance program.

When changed out, necessary pins, bushings and wear plates are renewed and the truck is kept for assignment to whatever unit next needs one; no plan is followed to keep any one set of trucks with any one unit. There are three spare trucks at Springfield for each major class of unit to provide different size wheels. Other major maintenance points have one spare truck.

Flashover Protection

Main generators are sent out for unit exchange at approximately twice the mileage of traction motors. This averages a million miles on freight units, 1.5 million miles in passenger service and every 12 years on switches.

In between these basic overhauls, main generators get treatment similar to that accorded traction motors, with the main exception being that they are allowed to get .004 inches out-of-round before stoning.

The Frisco places a good deal of emphasis on keeping generators clean, feeling that most flashovers occur from a combination of a dirty generator and a bad wheel slip, or from such specific causes as having a leaky water hose over the main generator or having the steam generator blowdown line too close to a traction motor, causing it, and the generator in turn, to flash over whenever the steam generator was blown down.

Corn cob blast is not employed—partially because it is too hard to clean up after and partially because the generators are kept continually clean by the introduction of an air filter in the intake air. Peach pits and aluminum oxide were also tried for this purpose but the results were considered unsuccessful.

Electrical Responsibilities

On the Frisco the electrical engineering department is primarily a service group for the mechanical and the engineering department, with the majority of its work for the latter. It serves essentially to solve special problems in the electrical field when called upon to do so by the department directly responsible for the item involved. The electrical engineer does, however, have line responsibility for air conditioning and the lighting of passenger cars and for a few minor items such as water coolers and the a-c generators for radio equipment.

For heavy repairs, new structures are preferred to converting former steam shops. While the cost is higher and the space provided is less, the Frisco thinks that the minimum space gives a neater shop and more productivity as less time is spent moving men and materials about

The present set-up grew out of the fact that the first diesel superintendent was a former electrical engineer. He was therefore his own expert in electrical matters and did not have to refer to the electrical engineering department to solve electrical problems. As a result it was not thought necessary to give the electrical engineer any great jurisdiction over the diesel field.

The electrical engineering department also overlaps in authority to some extent some of the other special departments, such as the supervisor of tools and special equipment. For example the conversion of a machine would be under this supervisor but whether to buy a new motor or to use an old one would be decided by the electrical engineer. Actually the Frisco has found that in making such machinery conversion about 80 per cent of the motors needed are new ones. Frequently this is because the old motor is the wrong horsepower—either too much or too little. Even where the old motor has excessive horsepower it is not considered wise generally to use it because of the larger controls and wiring required, and because of the adverse effect on the power factor.

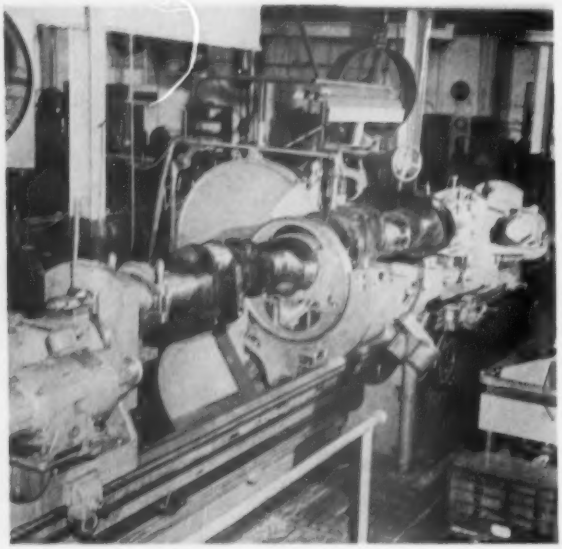
Operation Effects Inspection

For routine servicing between overhauls, the Frisco follows the standard builders recommendations for mileage inspection and repairs at 5, 10, 30 and 60,000 miles. When such routine comes due, no attempt is made to have different type inspections due the different units of a locomotive to keep the total volume of work relatively constant from day to day. Neither is an attempt made to have the same type mileage inspection due on each unit. Either practice would be too complicated with the Frisco type operation where units are cut in and out of locomotives as required by the tonnage and determined by the dispatcher, with no effort devoted to keeping the same groups of units together. All units could be due for a 60,000-mile inspection, all for a 5,000-mile, or any combination of these and the 10 and 30,000-mile inspections.

All Electro-Motive road freight and road switch power have 62:15 gear ratios while all Alco units of these two types have 74:10 ratios which give both makes a top speed of 65 mph and similar traction characteristics so that the two can be run together. These two makes are mixed together indiscriminately as are different models of each make and road switchers with road freight units. In the latter case, however, only one road switcher is allowed in a mixed consist (with one exception) to eliminate jack-knifing and it is always the second unit. No. 6 BL brake equipment on road switchers has also been modified to permit its operation with the 24 RL which is on all road freight power.

Allowable combinations (using the symbol F for road units and RS for road switchers) of road freight and road switcher units are:

F RS RS
F F RS
F RS F
F RS F F
F RS F F F



Similar to the practice of employing unit exchange for major overhauls on traction motors and main generators is the Frisco policy of employing outside contractors for some specialized mechanical jobs like crankshaft grinding

Also up to 3 road-switchers by themselves.

There are no other restrictions on the mixing of freight-geared units. One recent dispatchment, for example, comprised an F7, an Alco road-switcher, an F3, an Alco B and an Alco A unit.

Few Repairs by Engine Crews

In training enginemen how to handle failures out on the road, primary emphasis is placed on teaching them to give a clear description of the failure via train radio to an experienced maintenance man who can better diagnose the cause of the trouble and give step-by-step instructions on remedying it. Maintenance people are normally far more experienced in knowing how to remedy failures than an engineman could be trained to be. The use of these radio descriptions also helps the shop by giving a more accurate and detailed report. This helps speed repair of partial failures when they limp in, and to have proper equipment and parts on hand for repairing certain failures which are best not attempted while the units are on the road.

What Kind of Shops?

It is always a question whether it is better policy to convert an existing structure in sound condition for diesel maintenance or whether it is better to build an entirely new shop which can be laid out exactly as desired. Converting an old steam shop is normally much cheaper and provides more floor area and crane facilities although it is usually more expensive to heat and to maintain. Converting an old shop further avoids the congestion that almost universally occurs when a railroad is limited by today's high construction cost in the size of the building they can afford to build entirely new.

Though mindful of these advantages of conversion, the Frisco chose to follow the policy of building new shop structures (particularly for heavy repairs) because the line feels that by minimizing space to that absolutely required to do the work, the shop must be kept neater; (2) productivity is increased because much less time and effort is spent moving men and materials about; and (3) while a large amount of space is available in a converted steam facility, it is often of a shape that does not lend itself well to diesel needs. For a while, however, some heavy repair operations to components were handled in an abandoned steam erecting shop. This procedure was not considered economical, and all diesel work except frame and body straightening is now done in the diesel shop.

At outlying points there was the added reason that most existing structures were not in sufficiently sound shape to justify retaining. The more modern roundhouses, those with brick walls and concrete floors, have, however, been converted to diesel work at larger points where facilities had to be retained. At smaller points where it was possible to dispense with the facility, abandoned steam roundhouses, shops and maintenance facilities were torn down and the area opened for industrial development.

Local and Top Supervisory Relations

Relations between top management and supervisors at different points are aided by a semi-annual meeting between the chief mechanical officer and a group of 12 foremen from different points on the line. These foremen are representatives of the foremen's organization. The foremen get together by themselves at Springfield in the morning and with the CMO in the afternoon. These meetings give each supervisor on the railroad, either through his own attendance or through another who is representing him and knows of his problem, a chance to air these problems and discuss them with management. A foreman at one point gets a chance to learn the problems of other foremen at other points and how they were solved. Through these meetings the CMO also learns at first hand what problems are confronting supervisors.

The mechanical department is building up a committee of three technical men with varied educational backgrounds and experience to make special studies of problems ranging from flashovers to optimum engine life between overhauls. This committee will also assist shop men and others in taking the rough edges off ideas that they originate.

A book of recommended diesel practice is being compiled to outline wear limits for principal parts and all steps to be followed in repairing or renewing such parts. This diesel instruction book will substitute for the present practice of providing the workmen with this information through manufacturers inspection books modified as found desirable by experience on the railroad.

Employee Morale

Frisco employees appear to like their jobs and their railroad. This is indicated not only by the general attitude which one sees in Frisco shops, but by the interest the men have in their jobs as shown through the amount of original thinking that the employees do in devising better means of handling their jobs. Gadgets and all kinds of ideas developed by the men to help them in their work are found in greater-than-average abundance in Frisco shops.

Novel Aid To Diesel Operation

1 Because everybody likes to read about what is happening to others . . .

2 But nobody wants to be embarrassed by having his name attached to a mistake . . .

3 The Frisco puts out a series of diesel bulletins describing failures but not saying where they occurred or who was responsible.

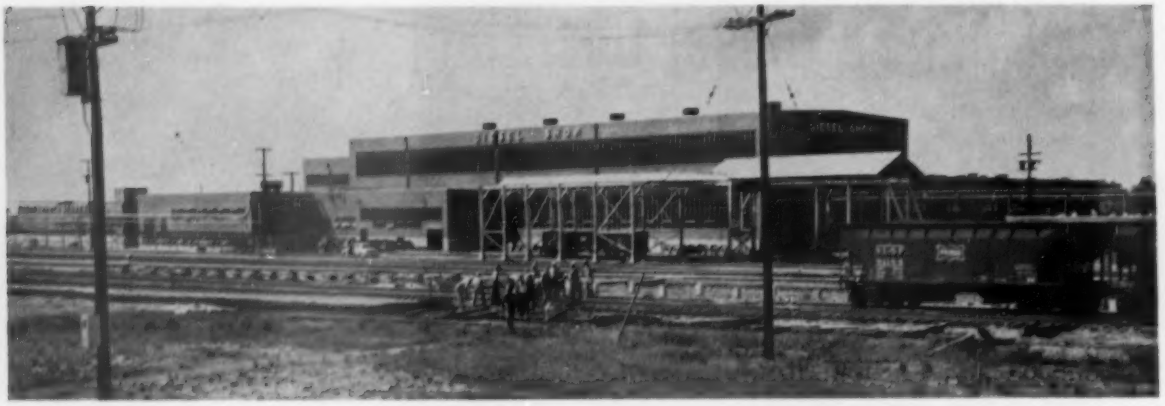
FUTURE BREAKDOWNS ARE REDUCED by acquainting mechanical and operating personnel with troubles that have occurred and why through a series of diesel bulletins issued from time to time. The bulletins are written by the maintenance department in an informal and even humorous style with such catchy titles as "How to Take the DIE out of Diesel."

These notes are normally divided into three sections—(1) what happened, (2) the cause, and (3) the lesson to be learned. They all deal with actual happenings on the Frisco, but in no case do they give the locomotive number, location or names of personnel involved. Thus the bulletins can play to the natural reader interest in news about other people, what happened, and how it might have been prevented, without embarrassing those actually involved or holding them up as examples of wrong-doing.

The study that goes into preparing these diesel bulletins has a secondary benefit. It permits failures to be grouped and studied. From such a study it was learned that flashovers on the Frisco occurred most while going down grade—probably due to the voltage build-up following the temporary reduction in load.

Gathering the information for the bulletins has also been helpful in providing data to solve problems. One example is a remedy for flashovers on the Electro-Motive units which has since been rather widely adopted. The problem resulted from oil vapor getting on the armature and commutator, making the dirt stick more firmly and reducing insulation values. Placing a dry and unoiled standard car body filter in front on the generator fan to catch most of the oil vapor kept the dirt that does accumulate dry and easy to blow off. The filters are replaced every 5,000 miles during which time they pick up an average of 5 ounces of oil and five of dirt.

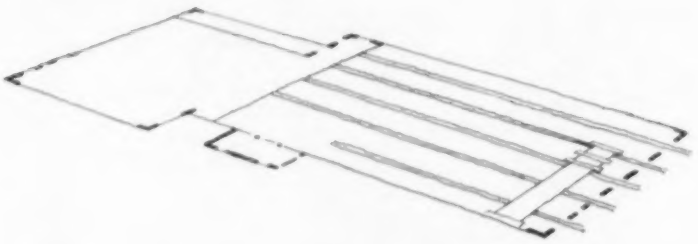
Before using this filter it was necessary to clean out the interior of the generator thoroughly at least every other annual. Since using the filters and blowing out the generator at 5,000-mile intervals, the need for the thorough interior cleaning at annuals has been virtually eliminated.



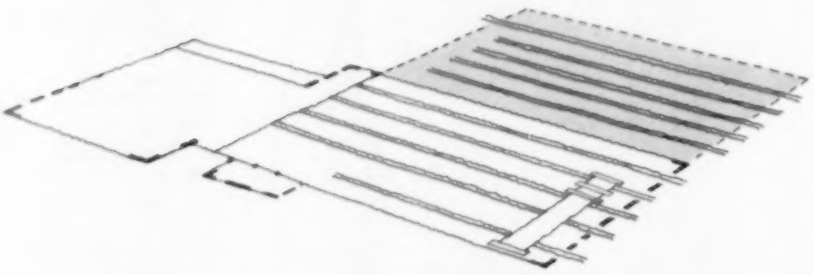
Springfield Diesel Shop

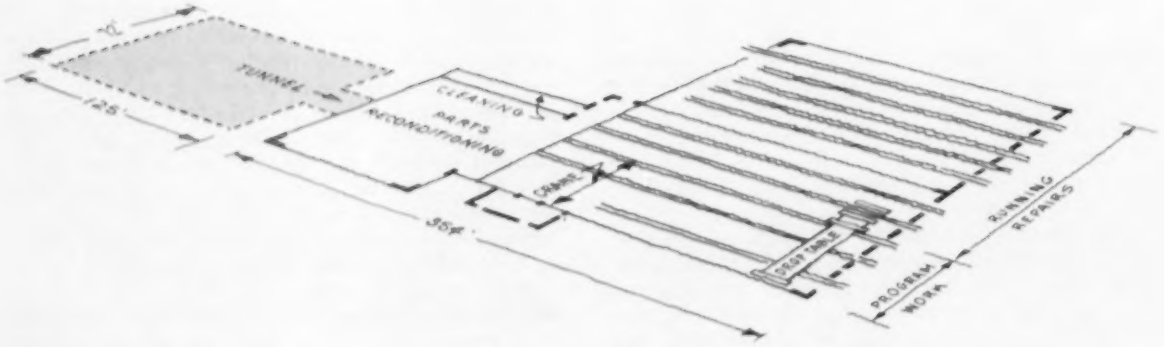
1—How It Grew With The Repair Load

1950—The original diesel shop was completed when the Frisco had 276 units. It included space for running and for heavy repairs with all stores under the same roof



1952—Two years later the fleet had grown to 407 units and four tracks were added mainly for running repairs and mileage maintenance





1953—A year later more space was needed to handle the growing load of heavy repairs. Building a new structure for stores and connecting it to the shop by tunnel at the basement level and by radiantly heated platform at the first floor level released 7,200 square feet for parts repair work in the diesel shop

By one conventional and one unique method of expansion, the Frisco has succeeded in approximately doubling the capacity of its major diesel shop without interfering with the original work plan or appreciably increasing material handling requirements.

The initial expansion by adding four tracks took care of the increased running repair requirements when the diesel fleet first began to grow but was relatively new. The second expansion—to take care of the increased heavy repair load—was more complicated, and it was made possible by the original design of the shop building.

When the shop building was first completed, everything necessary for the maintenance of the locomotives, including the stores department area, was included under the one roof. The Frisco took advantage of this feature when the need occurred to expand the parts repair area, and did it in a way that retained most of the advantages of having the stores in the shop building.

The solution consisted of erecting a new stores building 20 ft away from the blind end of the shop. The basements of the two buildings are connected by tunnel and the first floors by a radiant-heated platform to permit all-weather safe passage. Heavy items such as traction motors and generators are stored in the basement and can be delivered by fork truck directly to the point of use. Lighter materials are stored on the main floor on steel shelves.

Employees Don't Miss Windows

The building is windowless except in the corner where the storekeeper's office is located. Fluorescent lighting throughout and forced ventilation make windows unnecessary, and the employees do not seem to miss them.

The storage area released on the first floor (60 ft by 80 ft) is now a reconditioning room for parts which were previously overhauled in the engine repair room—air compressors, air brakes, injectors, speed recorders, etc. The air brake room that was at one end of the cleaning area was moved to larger quarters. The partition between the cleaning room and the old air brake room was knocked out and the cleaning area extended.

Only One Through Track

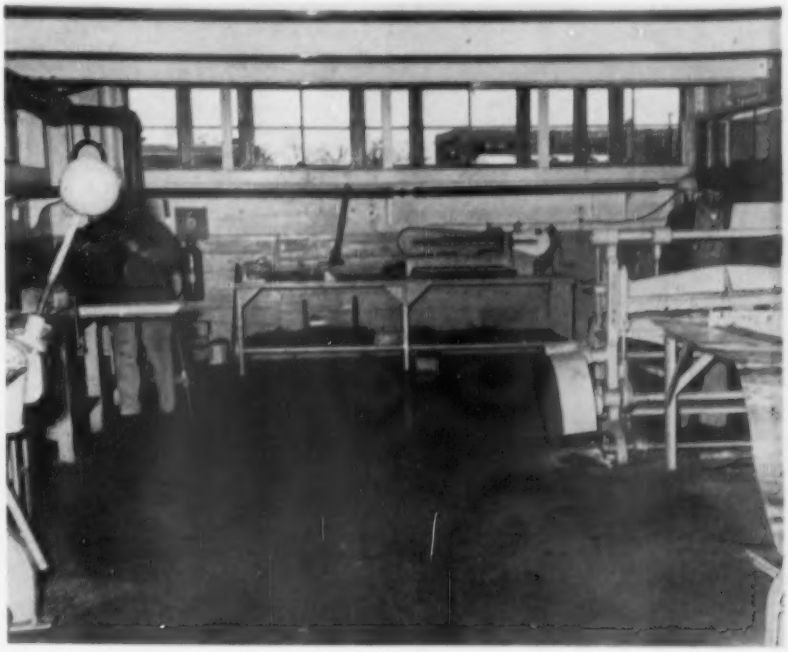
The present shop has nine tracks, 8 of which are approximately 215 ft long to accommodate four-unit diesels. The remaining track is 105 ft long and used mainly for switching power. All but track 2 have a full length pit. Track 4-9 have platforms on both sides, track 3 on the north side only. Tracks 1 and 2 have no platforms as they are in the dead work area.

Track 9 is the only through track. It is used for spotting the scrap car, which can thus be moved in and out either end without interfering with shop operations. In the original shop building before the 4-track extension was added, track 5 was the through track. When the extension was added, however, the west end of this track was walled off and the rolling doors moved to the track 9 location. The Frisco did not feel that any particular purpose would be served by an additional through track as eight of the nine tracks are long enough to accommodate four-unit locomotives.

The shop is built on three levels, basement, ground and first floor. The ground level is the track level while the first floor level is that of the top of the platform.

Most of the shop is on the first floor level. The only appreciable area at ground level is that surrounding tracks 1 and 2. It is served by a 30-ton traveling crane. Roofs are removed in this area, and trucks, engines and main generators changed out.

The basement includes a pipe and sheet metal shop, a radiator shop, locker rooms, oil storage, an electrical shop and a machine shop.



Taking over the basement stores area permitted moving the electric shop to larger quarters and converting the area it occupied into a shop for pipe and sheet metal work

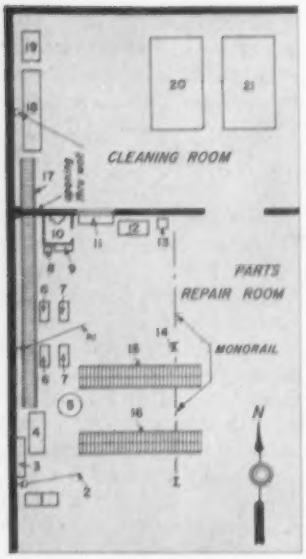
Springfield Diesel Shop

2—Layout and Operation

While the Springfield diesel shop is laid out in accordance with the usual pattern for facility of its type and size, it does have two features that distinguish it from other shops. The first is an extensive outdoor crane facility that extends far enough across the entrance end of the building for convenient transfer from the indoor traveling crane. It has two branches. One leads to the scrap car; the other covers the lye vat.

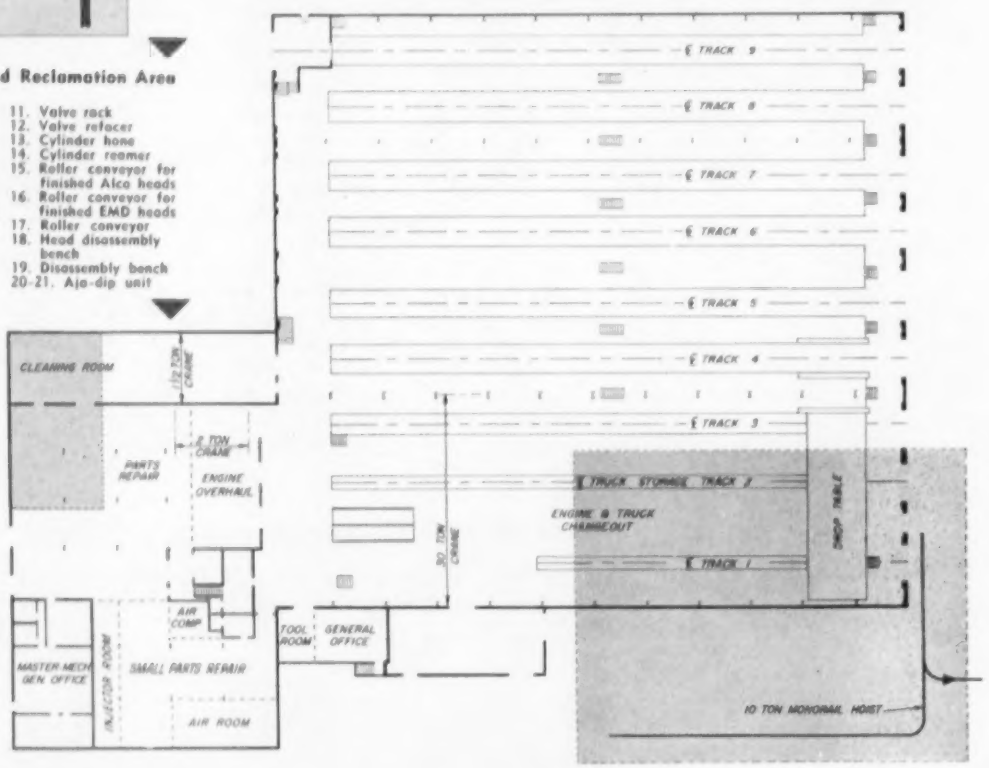
The hoist capacity is 10 tons and the lift 20 ft. In addition to scrap, it handles radiators, trucks, engine bases and blocks and other heavy parts cleaned in the lye vat rather than indoors.

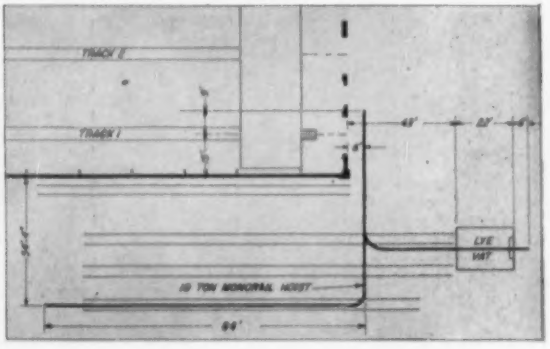
The head reclamation area is adjacent to the cleaning room and connected with it by a roller conveyor which runs through a slot in the wall separating the two areas. Two other roller conveyors—one for Alco and one for EMD heads—are also used in the assembly-line overhaul.



Equipment in Head Reclamation Area

1. Hydraulic Press
2. Jib crane
3. Parts bin
4. Valve seating and assembly for EMD heads
5. Parts bin
6-7. Valve seating and assembly for Alco heads
8. Water cooler
9. Cabinet
10. Washroom
11. Valve rack
12. Valve refacer
13. Cylinder hone
14. Cylinder reamer
15. Roller conveyor for finished Alco heads
16. Roller conveyor for finished EMD heads
17. Roller conveyor
18. Head disassembly bench
19. Disassembly bench
20-21. Aja-dip unit





Type and Amount of Work Done

The diesel shop today handles all heavy work on 348 diesel units and running repairs and inspection on 177 of these while 29 BLW, 16 F-M, 4 Alco and 17 GM switchers are maintained complete up to unit exchange at the point where they are stationed.

The shop turns out an average of seven heavy repairs a month. Work is done complete on engines, small motors and generators. Work on traction motors and main generators is done on a specific time or mileage basis until unit exchange is necessary. Wreck damage and heavy body work is taken care of in an adjoining building, as well as some auxiliary work not handled by unit exchange.

Normally four units at a time are undergoing heavy repairs, two each on Tracks 3 and 9, where operations on the overall locomotive are centered (Track 1 is used for switchers, Track 2 for trucks and 4-8 for trip servicing).

Repair operations begin on Track 3 where the unit is stripped and the body cleaned. Engines are removed here by the 30-ton traveling crane and set on dollies near the engine overhaul section. After stripping, the engine base and block are carried to the lye vat by the traveling crane and the outdoor monorail. At the same time the smaller components make a circular path in being cleaned, overhauled and returned to the repair area for reassembly—not necessarily to the same engine frame from which they were removed.

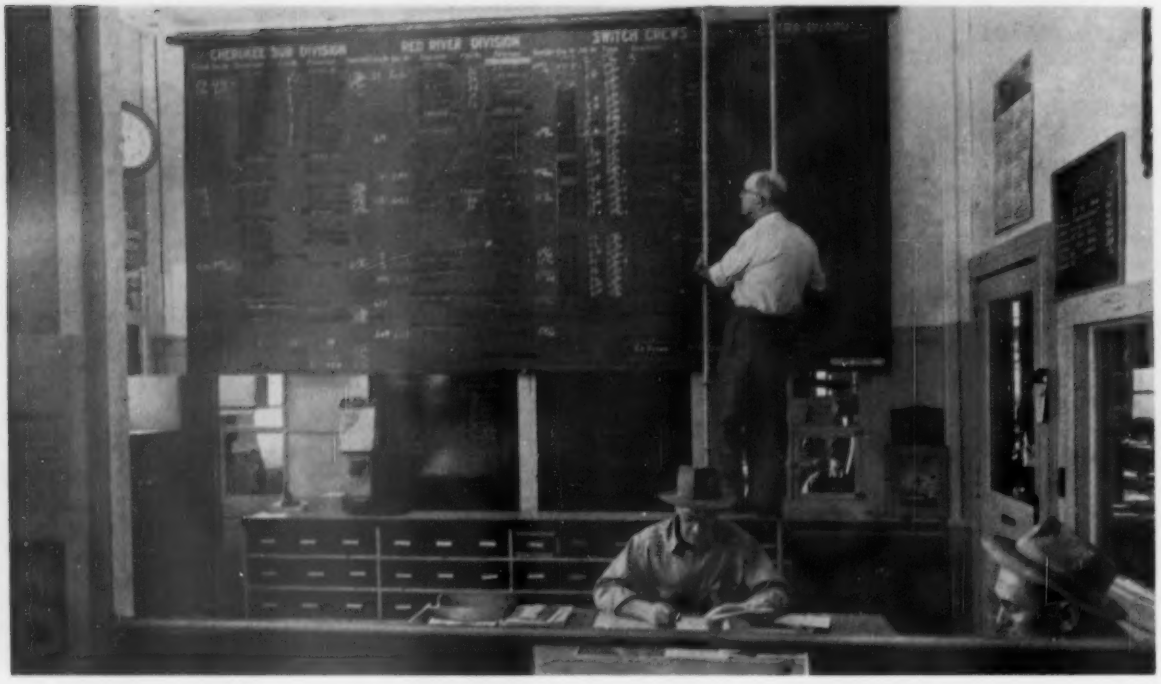
Major components are re-installed on the unit on Track 3, after which it is moved to Track 9 for piping and wiring and for load testing. Any interior painting needed is taken care of on Track 3, exterior touch-up work on Track 9. Complete paint jobs are done in the nearby coach shop.

Because the Frisco believes that it is more economical to tailor a new structure to diesel repair needs than to convert existing buildings, little use was made of the existing steam facilities to handle the growing repair load at Springfield. One large building, the 173 ft by 566 ft former steam erecting shop, was once used for operations requiring large machinery or heavy cranes but now only heavy body work is done outside the main diesel shop.

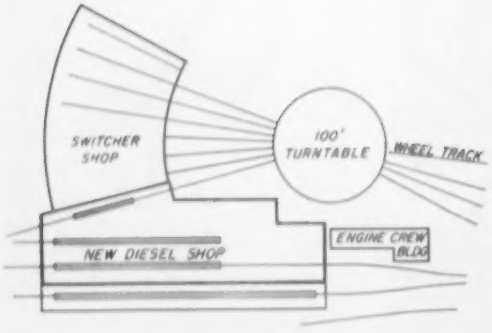
Heads are cleaned and disassembled in the northwest corner of the cleaning room, loaded into a protective covering and placed on a roller conveyor which . . .

Extends directly into the head reclamation area through a slot in the wall and terminates at a work bench fitted with air hoses, power tools and holding devices to position the head

Wheels are rotated by an air motor while being cleaned adjacent to the lye vat which is served by a branch of the outdoor monorail crane



Outlying Shops



EXTENSION TO ROUNDHOUSE at St. Louis serves as the main diesel shop with stalls in the old house used to maintain switch and general purpose units

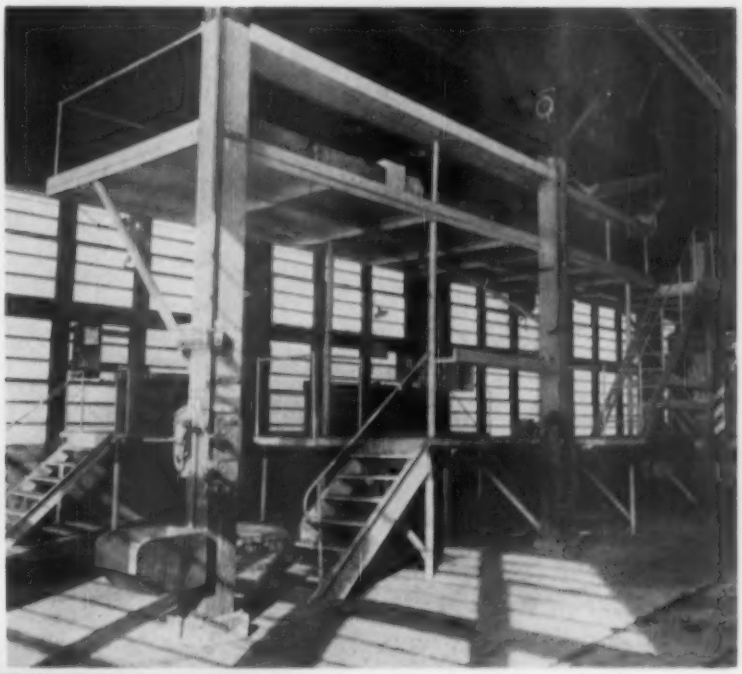
PARTS OF OLD SECTIONS of some enginehouses were retained for storage and for handling jobs like burning or paint scraping that would interfere with work in the main maintenance section

Nearly half of all diesels on the Frisco receive mileage maintenance at the main mechanical facilities at Springfield and most of the remainder at four points—Tulsa, Ft. Smith St. Louis and Amory, Miss. Each of these maintains from 48 to 77 units. Other points under the jurisdiction of master mechanics at the above locations often handle their own switchers. For example, Amory handles 18 Baldwin switchers for engine work up to crank-shaft removal, traction motor and main generator work up to unit exchange and the turning of mounted wheels.

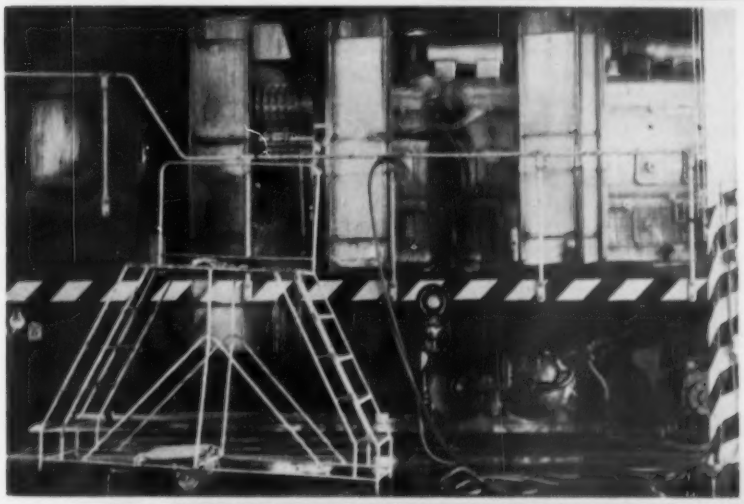
Converted enginehouses are the usual pattern but with a few exceptions such as a combination new straight-line servicing facility with the old house at St. Louis and a new single stall building at Wichita. Side transfer tables for changing trucks are standard at all but the smallest points.

St. Louis is the only maintenace point outside of Springfield that can remove an engine. It has a 25-ton crane with a 5-ton auxiliary hoist. St. Louis works the trucks it removes to restore them to first-class condition

BY CONSOLIDATING THE ENGINEHOUSE and the callers' offices at several points, the 'phone is manned at all times, the foreman is relieved from running back to answer it every time it rings, and receipt of important messages is not delayed because nobody is within hearing distance of the 'phone.

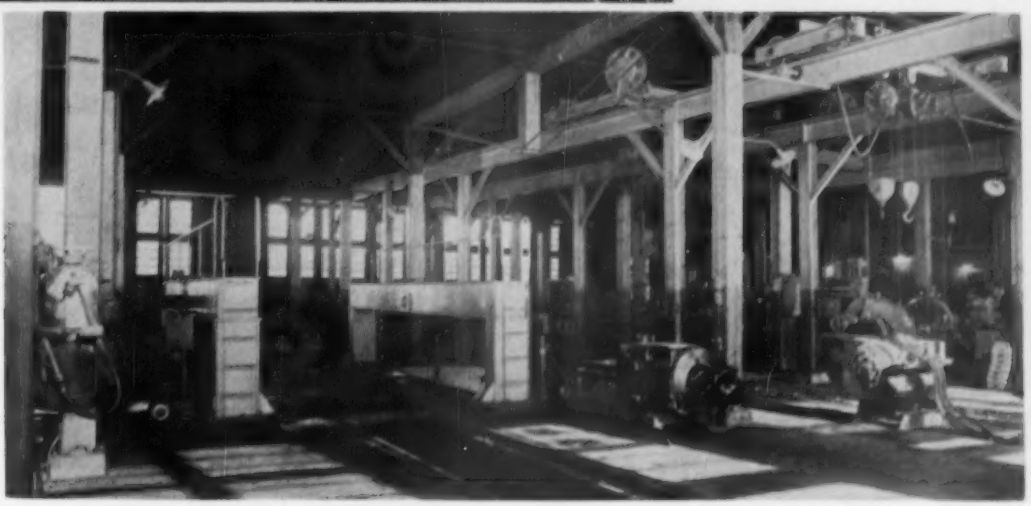


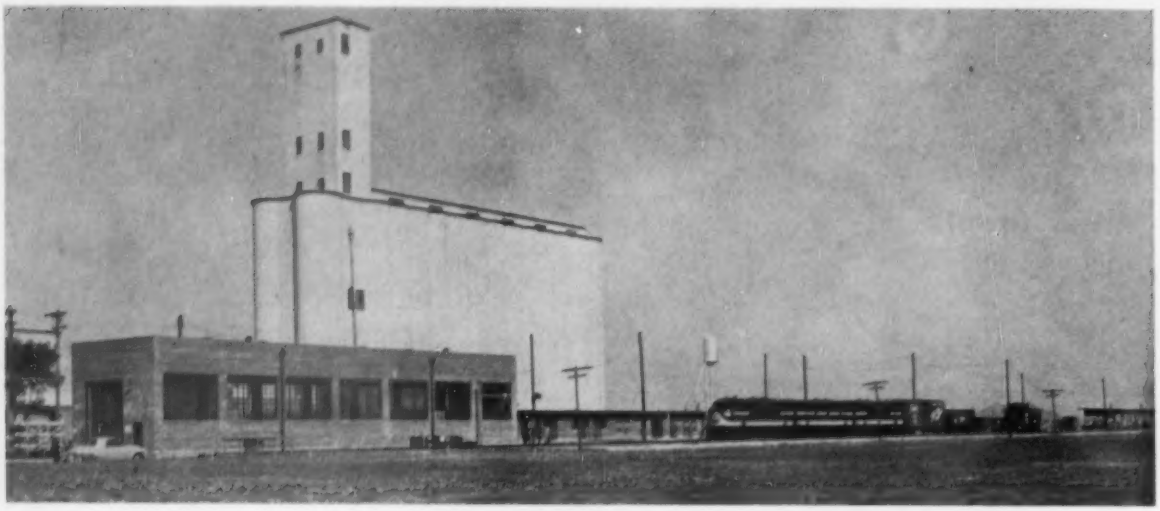
HIGH-LEVEL PLATFORM for working Fairbanks-Morse units at Tulsa. Other major enginehouses have similar special facilities for doing all heavy work up to unit exchange when a large group of a given make is assigned for maintenance



PORTABLE STANDS are widely used at converted enginehouses in place of fixed platforms for servicing both hood and road type units.

COMPACT TRUCK and traction motor repair area at Tulsa includes small traveling crane overhead and wheel lathe adjacent. Side transfer tables like the one above are widely used at outlying points as a compromise between the more expensive drop table and the less efficient practice of rolling trucks out by hand





NEW SERVICING BUILDING 132-ft by 32-ft at Wichita with single through track and 45-ft inspection pit

but sends any engines taken out to Springfield for rebuilding. The engine house machine shop does all wheel work, both car and locomotive, for the division except those requiring removal of wheels from axles.

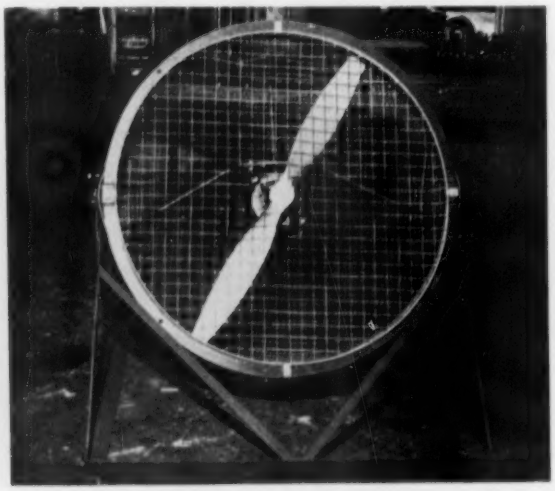
The rather large extension put on the enginehouse opens directly into it. All stalls have a concrete floor but no platforms as they are used for maintaining switchers and general purpose locomotives.

Road units are serviced in the extension itself which has two stalls that can accommodate a four-unit locomotive and one stall that will accommodate a two-unit locomotive. Generally, however, all four-unit locomotives are worked on the outside track because the wheel transfer table is blocked when a four-unit locomotive is worked on the center track.

Tulsa is the largest outlying point and the only shop outside of Springfield to have an exclusively Frisco diesel club. Tulsa maintains 77 units and gives trip servicing to an average of 40 units a day.

Generator and traction motor work to Tulsa-assigned units is done either on a time or mileage basis at Tulsa; and, at a specified time, the above components are sent to the factory on a unit exchange basis. EMD and Alco units are sent to Springfield when engines are due for heavy overhaul, but truck work is done complete on all types of power. Fairbanks-Morse locomotives are given all maintenance up to unit exchange as all Frisco F-M power is assigned to Tulsa and the facilities installed for inspecting and servicing this type of power also facilitate heavier repair requirements.

CANTILEVER RAIL EXTENSION and crane for handling wheel sets and traction motors into the diesel extension of the St. Louis roundhouse. This idea permitted using a convenient storage area on rails across the turntable (which had to be retained to get switcher units in and out of the original stalls)



WHERE PAINTING IS DONE at outlying points not equipped with exhaust facilities the Frisco places this type fan in the pit. While it does not exhaust the fumes to the outdoors it does mix them sufficiently with the shop air to keep the mixture below the flash point concentration

Standard Journal Box in for Change

Proposed modifications in design of parts, new methods of lubrication, additive oils and education of box packers discussed at January meeting of the New York Railroad Club

The united effort which is being made by the railroads, under the leadership of the Association of American Railroads, by many individual railroads, and by various commercial interests to get out of the solid journal bearing in freight service its full capabilities was the theme of the New York Railroad Club meeting held at the Hotel Commodore, New York, on January 20.

The program, sponsored by the AAR, was presented under the chairmanship of W. M. Keller, executive vice-chairman and director of research, Mechanical Division, who introduced the six speakers.

R. G. May, vice-president operations and maintenance department, AAR, opened the program with a brief statement of the things hot boxes do to orderly railway operation. H. W. Wood, assistant chief of motive power, car, Pennsylvania, described the changes that are being proposed in journal-box parts and suggested the procedure by which they can best be made to contribute to an improved standard journal-box assembly. C. S. Patton, Jr., assistant superintendent of motive power, car, Norfolk & Western, told of the tests of that road of waste packing substitutes and stated his views as to the requisites of a satisfactory means of feeding oil to the bearing. M. S. Clark, of the research and technical department of the Texas Company, told of a co-operative program conducted on the N&W to determine whether oils other than that specified by the AAR would reduce hot boxes. R. W. Seniff, manager of research, Baltimore & Ohio, told of the effect of an educational program for the training of employees who service journal boxes in improving journal-box performance. Rosser L. Wilson, vice-president, American Brake Shoe Company, described the Mahwah journal-bearing laboratory* of that company with slides and showed some of the bearing types which have been under study at that point. Some of these are illustrated.

*For a description of the Mahwah laboratory see Railway Locomotives and Cars for May 1954, page 67.

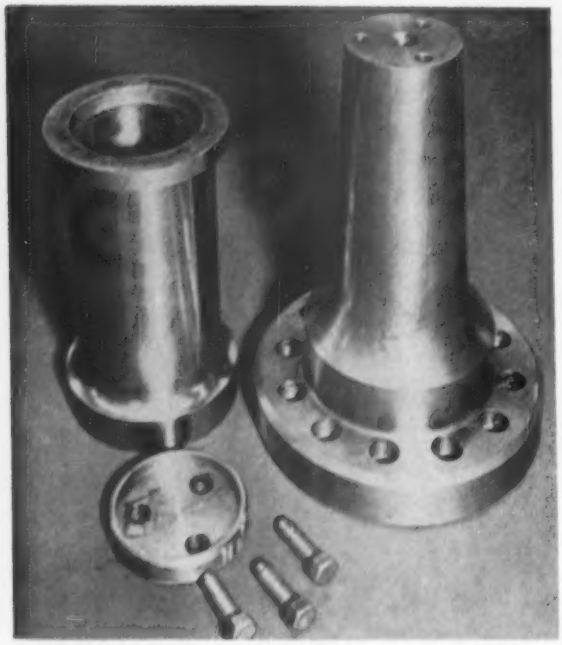
We believe that more can be done to prevent hot boxes by education than by any other way. To us, it means that the education starts at the top and works downward and laterally through all the individuals who are in any way connected with the operation and maintenance of freight cars.—R. W. Seniff, manager of research, Baltimore & Ohio.

Hot Boxes Upset Orderly Railway Operation

Before he dealt directly with the effect of hot boxes on railroad operation, Mr. May said that the AAR was glad to sponsor the meeting because it served to bring railroad men up to date on journal-box developments, which are moving rapidly. The AAR, said Mr. May, has for some time been extensively engaged in research and the results have been profitable. From 55 of the 90 research projects which have been undertaken by the association, he said, it had been estimated that the railroads had profited to the extent of $100,000,000 a year. In the case of journal-box lubrication, he said that research projects have been conducted for the association at Franklin Institute and the Illinois Technical Institute, by the association, itself, and by individual roads.

Several operating problems are created by the occurrence of a hot box, he said. First, the dispatcher may have his train movements upset and may have to realign the movement of several trains. Then, the yard master, who has his tracks and yard crews arranged for an expected on-time movement, must readjust his plans and

THE REDIPAK LUBRICATOR (left) developed in the test plant of the American Brake Shoe Company at Mahwah, N. J. It is a molded neoprene foam block with cored passages covered with cotton wicking material. It is square and gromets in the corners permit use of a packing hook to remove it from the box. Right—The Redipak shown in section



A RENEWABLE axle sleeve developed at the American Brake Shoe Laboratory at Mahwah. It is hardened and ground. If damaged, it can be removed and replaced by means of a hot-water shrink fit.

suffer a loss of yard-crew time. Road-crew overtime results; it may be necessary to call an extra crew; the outgoing crew, called with the expectation that the train will arrive on time, will collect for the initial terminal delay. Even more serious than these losses and annoyances are the hazards created by hot boxes which occur in fog or snow storms and so escape detection.

In concluding, Mr. May spoke with satisfaction of the progress which is being made in improving journal-box performance. This must go on, he said, until the full potential of the solid bearing has been developed.

New Journal-Box Detail Designs

Today there are on the railways of America three types of packing retainers, at least nine types of journal lubricators, seven types of lubricating pads, several new ideas on journal bearings, and other items, all intended to make a freight car operate with minimum difficulty from hot journals. In designing equipment for use in the journal-box assembly, Mr. Wood said, parts must have longer life and be trouble free for longer periods. Roads must ultimately be able to extend repack periods to at least 36 months to coincide with the period for air-brake attention. Minimizing the need for journal-box servicing at originating, interchange and intermediate points is necessary to reduce opportunities for man failure and to effect substantial economies.

A pressing need is a more trouble-free method of

Progress in improving journal-box performance must go on until the full potential of the solid bearing has been developed.—R. G. May, vice-president, Operations and Maintenance Department, AAR.

While we realize our responsibility to investigate new designs of products to determine their value, we nevertheless feel that faster and more satisfying results acceptable to all railroads could be obtained by a coordinated testing procedure . . . Additional funds should be delegated to the AAR and a comprehensive testing program conducted to consolidate and perfect the designs that have been presented to the association in the past five or six years.—H. W. Wood, assistant chief of motive power, car, Pennsylvania.

applying lubrication to the journal and bearing. Three approaches to this problem are the waste retainer, the lubricating pad, and the journal lubricator. Five years' records on the Pennsylvania show that waste retainers have produced favorable results. Too much trouble has been experienced with the wire spring type being broken or out of place, however. Some require removal several times between repack periods to set up the packing. For ultimate success, he said, these objections must be overcome. Lubricating pads are in the process of improvement as the result of tests in service. Journal lubricators are on trial on many roads. Some of them have required modification to withstand the service shocks to which they are subjected on freight cars.

A number of designs of journal bearings, such as the ductile iron bearing, the flat-back bearing, the counterbored bearing, the ventilated bearing, and the full sleeve type bearing, have been offered to the railroads and tested to some extent. Probably a combination of the best features of these types will produce better results than those obtained from existing bearings. Mr. Wood believes that consolidation of the bearing and wedge would be an improvement and suggests that effort be made to perfect and test such an arrangement.

Mr. Wood told of the tests made by the Pennsylvania on the ventilated bearing designed by the AAR. The tests included some of the other devices previously mentioned. Conclusions from these and other tests are that the ventilated bearings ran from 10 to 20 deg cooler in hot weather, he said. Lubricating pads produced lower temperatures than waste packing, but have had to be changed to overcome weaknesses. Thread risers in waste-packed boxes are still a problem and retainers are beneficial in reducing this condition.

The refrigerator-car tests of fitted journal bearings, Mr. Wood said, show definitely improved bearing performance and decreased overheatings. This requires step size journals, and a system of marking journals and bearings has been developed to minimize main failure in the application of the bearings. The journal sleeve design, if perfected, will require but one size of fitted bearing which can be applied to the standard axle without a sleeve or to the axle with the sleeve. Mr. Wood recommends the elimination of the axle collar, application of a sleeve similar to that employed by the roller-bearing manufacturers, and one size of bearing for each axle size. He considers that much is to be gained if the best features of the fitted bearing of flat-back design, the journal sleeve and the collarless journal are combined and a new design of journal-box assembly developed.

The Pennsylvania is planning to test bearings made

It is very doubtful whether any railroad can afford to continue spending the money necessary for maintaining waste-packed journal boxes well enough to meet today's demands of long trains operated at high speeds and with short terminal time. It will be largely up to the management of every railroad to decide whether a little more should be spent now in development in order to reduce high maintenance costs later, particularly when some of those costs are hidden.—C. S. Patton, Jr., assistant superintendent of motive power, car, Norfolk & Western.

of aluminum alloy and tests will also be conducted with journal sleeves to provide for the use of fitted bearings, which should not only reduce hot boxes, but also lengthen the life of freight-car axles.

"While we realize our responsibility to investigate new designs of products to determine their value," he said, "we nevertheless feel that faster and more satisfying results acceptable to all railroads could be obtained by a coordinated testing procedure . . . Additional funds should be delegated to the AAR and a comprehensive testing program conducted to consolidate and perfect the designs that have been presented to the association in the past five or six years."

New Lubricating Devices Promising

The waste-packed journal box, said Mr. Patton, has survived almost unchanged from the earliest days, while nearly every other feature of railroad equipment has been vastly improved. This is because the first cost of waste is lower than any present substitute; it can be reclaimed and reused indefinitely; it requires no highly skilled labor to install and maintain it, and, given adequate attention, its performance is good. But maintenance costs are high and are accompanied by train delays at each terminal for inspection, setting up the packing, and additional lubrication. Waste tends to cling to the journal, to roll in the box and to creep under the bearing. About 40 per cent of hot boxes on the N&W are charged directly to waste grabs and half as many to lint accumulations, not including a large proportion which are listed as "undetermined." There is now a general feeling that little further improvement can be expected in the performance of the waste-packed box.

A satisfactory substitute, said Mr. Patton, must provide adequate lubrication under adverse conditions. Its overall cost must come within the range of the waste-packed box; it should eliminate waste grabs and lint accumulations; it should work in the present box with minimum modifications; it should not need skilled mechanics for servicing, and it should not be subject to sudden failure.

Mr. Patton told of the five pad-type lubricators which the N&W now has under limited test: (a) cotton yarn loops sewed through a canvas backing and then rolled into a pad; (b) two different cellulose sponge lubricators; (c) a pad of nylon fibers platistically bonded together at elevated temperatures; (d) waste cemented and stitched together around a neoprene core resembling a honeycomb; (e) a neoprene rubber sponge center enclosed in a canvas bag through which are sewed a bed of cotton yarn loops. None has had sufficient service to determine whether it is going to be the answer to hot boxes. All exhibit improvements over waste packs in reducing lint and avoiding waste grabs, he said, and require only reasonable oil consumption. First cost is higher than waste, but only careful records over several years will determine the overall cost. They run at least twice the present repack period before requiring removal, he said. Most of them do a little better lubricating job than waste and he thinks that bearing life may be extended. Operating temperatures are definitely better than with waste.

A CARTRIDGE sleeve bearing unit to fit in a standard journal box. The body is a one-piece babbitt-lined bronze casting, with a cored oil reservoir and pad lubricator. It is held in place by a bolted-on journal collar and closed by a snap cover. Developed at the Mahwah laboratory of the American Brake Shoe Company

"It is very doubtful," said Mr. Patton, "whether any railroad can afford to continue spending the money necessary for maintaining waste-packed journal boxes well enough to meet today's demands of long trains operated at high speeds and with short terminal time. It will be largely up to the management of every railroad to decide whether a little more should be spent now in development in order to reduce high maintenance costs later, particularly when some of those costs are hidden."

Better Oils Improve Performance

For about 20 years from 1929, Mr. Clark said, no great changes were made in the quality of car oils. This was because of the fairly rigid AAR specifications covering straight mineral oils to meet which it was not necessary to provide highly refined or additive type car oils. The low revenue derived from these low-cost oils did not encourage much research on the part of the suppliers.

For some the need has been felt for higher quality

(Continued on page 155)

We do not feel that any journal-box oil will be a panacea for all the hot-box troubles on a railroad. A good oil is only one of the factors.

Although we feel that a premium car oil represents a substantial improvement . . . we do feel that a still better product could be made if economic factors were not too stringent.

Regardless of what medium is used to get oil to a bearing, it is our conviction that oil quality in the long run will pay for itself.—M. S. Clark, Research and Technical Department, Texas Company.

A REFRIGERATOR CAR being cooled down to operating temperature after inspection. The water sprays speed the process materially

Santa Fe Girds to Service Reefers

In anticipation of things to come, the San Bernardino shop is being equipped to inspect and maintain mechanical refrigeration cars

■ The Santa Fe has developed means for maintaining mechanically refrigerated cars at its San Bernardino, Cal. shop, and is increasing and improving its facilities to take care of the rapidly growing number of such cars, which are being placed in service.

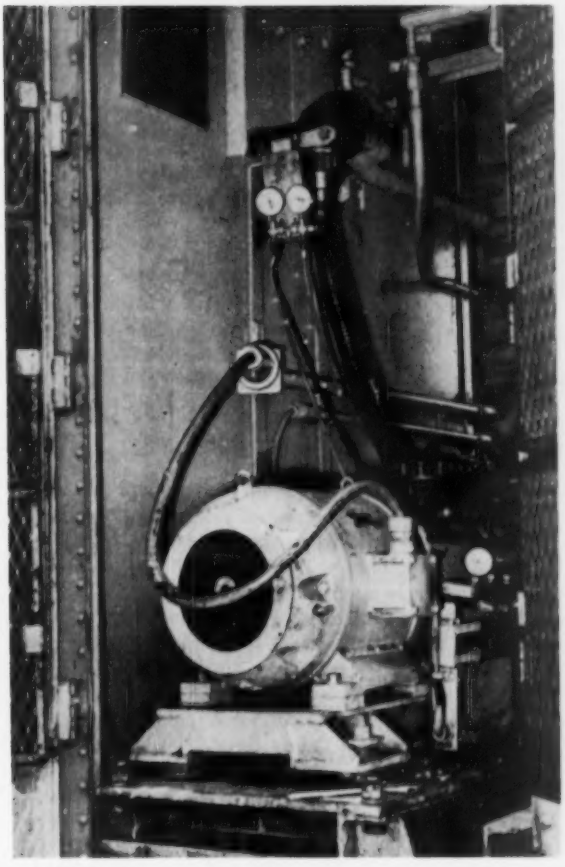
Mechanical refrigerator cars require pre-trip, monthly, two-month, semi-annual and annual inspection. San Bernardino makes part of the short term inspections and all annual inspections. It also performs all heavy overhaul, including all engines and compressors.

Thirty-six items appear on the pre-trip inspection requirement sheet. These include the checking of all oil, water and refrigerant levels and pressures, making sure there are no leaks, cleaning of screens, strainers, sumps and pans, checking the operation of protective and operating devices, measuring battery electrolyte gravity and charging current, checking motors for correct rotation, adding lubricant where necessary and filling fuel tanks. Finally, with all equipment functioning properly, the car is cooled down to —5 or —12 deg F.

Since the climate at San Bernardino permits, the work is done in the yard and during the cooling down run the exterior of the car is sprayed with water. Evaporation is high and cooling time is materially reduced in this manner. On one test run, the interior temperature of a car was reduced from +27 deg F. to —1 deg F in 3 hours. Without the spray, it is difficult to bring the temperature down in the time available.

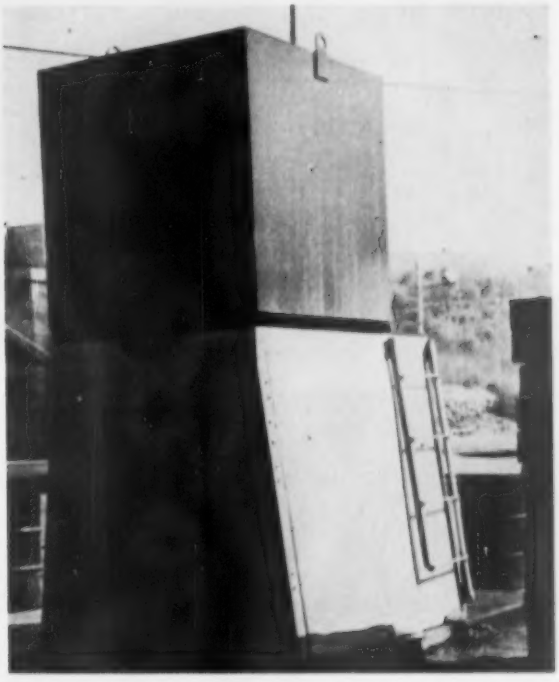
During the monthly inspection all of the pre-trip inspection is repeated and, in addition, filters are changed, linkages lubricated, the refrigeration system checked for leaks, radiators blown out, fuses and pilot lights checked, electrical connection terminals tightened, motors and generators inspected and serviced, and all mounting and fastening of bolts and clamps is made secure.

Additional work done at the time of the two-month inspection includes changing of lubricating oil in the engine and fuel injection pump, blowing out the engine radiator, cleaning the air cleaner tray, greasing generator,



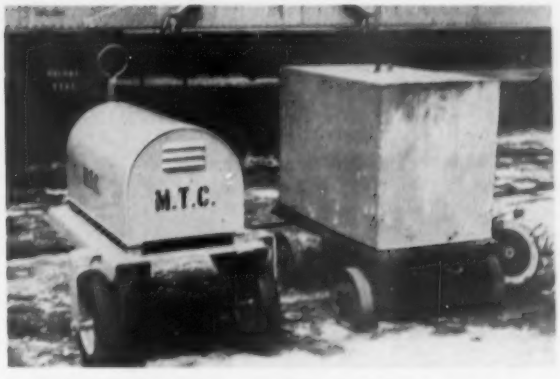
INTERIOR of one of the engine-generator compartments

PORTABLE inspection yard fuel tank



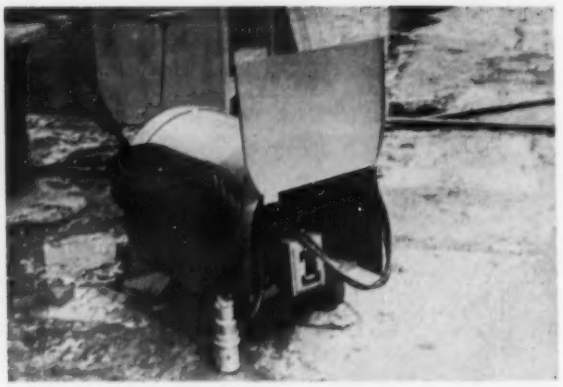
FUEL is normally supplied from this tank in the departure yard

FREON TANK in tipping mount on the weighing scale

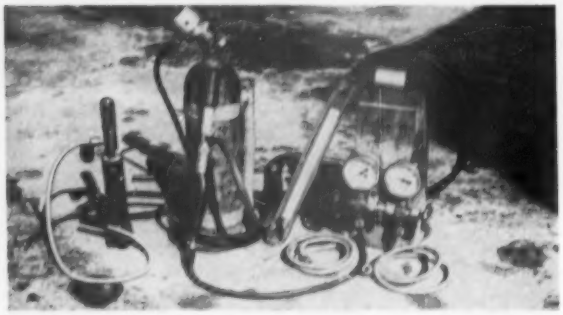


MOTOR-DRIVEN vacuum pumps with protective housings

PORTABLE motor-driven vacuum pumps with covers removed



PORTABLE motor-generator set for charging 12-volt batteries



FROM left to right, alcohol-burning leak detector, Prestolite leak detector, manometer and manifold gage

A PORTABLE voltmeter is used to check load and no-load generator voltage

A 16-POINT temperature measuring device quickly determines temperature at various points in the car

radiator fan, evaporator fan and compressor motor bearings, and checking the setting of safety switches.

At the time of the semi-annual inspection, injectors and injector nozzles are inspected and fuel pump and injector timing is checked in addition to the work done on shorter time inspections.

For the annual inspection, the additional work done includes repair of racks, floors, linings, lading anchors, door seals, complete overhaul of running gear and brake rigging, and the sandblasting and painting of trucks and car if necessary.

The time between engine overhauls is expected to be about two years.

Certain special equipment is necessary for the servicing of the cars. At present the Santa Fe is using two motor-driven pumps for removing moisture and air from the refrigerating systems. These pumps must be capable of pulling a high vacuum since moisture cannot be removed unless the vacuum is more than 29.6 in.

It is necessary to remove, restore and add refrigerant to the cooling systems and for this purpose a tipping truck, shown in one of the illustrations, is used for handling freon cylinders.

A fueling tank on a truck is used for fueling cars in the overhaul yard. A larger stationary tank in the departure yard is used regularly for filling fuel tanks. An air motor-driven pump is used for filling this elevated tank.

Some foreign cars serviced in the yard are equipped with 12-volt batteries. To insure that these cars leave with fully charged batteries, there is a portable motor-generator set which receives its power from the yard standby power lines.

Instruments include a portable voltmeter for checking generator voltage at load and no load. There is a manometer for measuring the difference of pressure between the intake and outlet of the evaporator. This is used for setting the defrost switch.

There are two halide leak detectors. One, which is of small size to allow for easy portability, employs an alcohol torch. The other, somewhat larger, uses a gas flame supplied by a tank of compressed gas.

Manifold gages are used for measuring pressures on the high and low side of the compressor and a Minneapolis-Honeywell temperature measuring device with a 16-point switch is used for measuring temperatures throughout the car and for setting superheat on the expansion valves.

MEMBERS of the Land Transportation Committee attending the Winter General Meeting of the American Institute of Electrical Engineers held in New York, January 31—February 4. Top row, left to right: H. P. Wright, Electrical Engineer, Baltimore & Ohio, S. R. Negley, Electrical Engineer, Reading, P. H. Hatch, General Mechanical Superintendent, Long Island, E. A. Foster, Fairbanks, Morse & Company, A. M. Harrison, Westinghouse Electric Corporation, J. H. Ray, Electrical Engineer, Erie, Llewellyn Evans, Tennessee Valley Authority, J. C. Aydelott, General Electric Company, D. F. Haney, Assistant Engineer, Diesel Equipment, Canadian Pacific; W. S. H. Hamilton, Consulting Engineer; lower row, left to right: Charles W. Martin, Diesel Electrical Supervisor, Baltimore & Ohio, V. F. Dowden, Assistant Mechanical Engineer, New York, New Haven & Hartford, P. G. Lessmann, Westinghouse Electric Corporation, H. F. Brown, Gibbs & Hill, Inc., R. L. Kimball, Gibbs & Hill, Inc., Maurice C. Swanson, American Locomotive Company, J. Stair, Jr., Electrical Engineer, Pennsylvania, L. E. Birch, Ohio Brass Company, and L. S. Billau, retired, Baltimore & Ohio

Electrical Engineers Talk Traction

■ Rectifier-type electric locomotives and cars and their influence on communication circuits were major railroad subjects under discussion at the Winter General Meeting of the American Institute of Electrical Engineers, held in New York, January 31-February 4, 1955. Thermal stability of a new type of traction motor insulation and an electric snow plow for operation with diesel-electric locomotives were also the subjects of papers and discussion.

Rectifier-type locomotives and multiple-unit cars, traction motor insulation and an electric snow plow receive attention of AIEE

Ignitron M-U Cars

There are now 100 Ignitron rectifier-type, multiple-unit cars in operation on the New Haven. A paper giving detailed information concerning their construction and design by E. W. Ames, Westinghouse Electric Corporation, and V. F. Dowden, assistant mechanical engineer New Haven, was presented by Mr. Dowden. These cars were described in the March 1954 and June 1954 issues of *Railway Locomotives and Cars*.

Some pertinent information concerning the performance of these cars was developed during discussion. From this it was made evident that riding characteristics of the cars are exceptional—that motor cars are as smooth as trailers. Commutators of the diesel-type d-c traction motors are in perfect condition after 75,000 miles of operation; a performance record that is much better than that for a-c motors in the same service. Brush life is much longer than that on a-c motors and there are fewer brushes. One of the advantages of using d-c motors is that they are now in quantity production. It is the belief of railroad electrical engineers that rectifier locomotives and cars will cause railroads to use more straight electrification. Commercial type rectifier tubes are now used. There have been no arc-backs except for two caused by defective tubes. The 400 tubes on the New Haven cars have been in service 10 months, and those in service on the Pennsylvania indicate they are a long-life device.

D-C Motors on Rectified Power

Special considerations which need be given to the operation of d-c locomotive traction motors on rectified a-c were covered in a paper by M. Simon, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa. Mr. Simon explained that in past years various attempts have been made to power locomotives by 25-cycle, single-phase rectified voltage applied to d-c series motors. Early efforts were unsuccessful, mainly because of the faulty operation of the mercury-arc rectifier. Continued research and development, however, have now made the operation of d-c traction motors on mercury arc rectifiers in locomotive service entirely feasible from

a technical standpoint. In recent years an additional feature has entered the picture. The development of the diesel-electric locomotive has resulted in a standardized, low-cost, d-c traction motor suitable for general purpose road locomotive applications. Hence, any present-day electric locomotive design employing d-c traction motors can benefit by the use of such standardized motors. An example of this is found in the rectifier locomotives recently built by the General Electric Company for the New York, New Haven and Hartford wherein the standard d-c traction motor was applied. The problem of operating these motors on rectified single-phase, 25-cycle power resolved itself into the problem of smoothing the undulating current to a sufficient degree so that this motor would not be harmfully affected from either a stress or performance standpoint.

Although rectified alternating current has been used for many years as a source of power for d-c motors, it has largely been derived from multi-phase rectifiers operating on three-phase systems. The current resulting from such a system is essentially pure direct current, with an insignificant amount of ripple. On the other hand, the ripple existing in the output of a rectifier operating on single-phase alternating current is of considerable magnitude and would adversely affect both motor performance and maintenance. Fortunately, this ripple can be reduced by filter components of practical size to a point where its adverse effects are limited to a tolerable value.

Mr. Simon's paper explains the effects of eddy current, commutation, heating, torque pulsations and smoothing reactors and their relation to design characteristics.

Concerning motor modifications, Mr. Simon says: "As installed on the New Haven rectifier locomotive, the standard d-c traction motor as applied with the rectifier locomotive was slightly modified for 660-volt third rail operation into Grand Central Terminal, New York City. One of these modifications was provision for a ground return current path to bypass the 660-volt current around the locomotive roller bearing journal boxes. The standard axle lining flange dust guard was replaced with a combination dust guard and ground brush assembly. The ground return cable is connected to the ground brush assembly.

"Another modification consists of a flash ring assembly designed to provide motor armature bearing protection by directing flashover currents to ground through the ring.

"These modifications are designed as features which can be easily added to the standard diesel-electric traction motor."

Mr. Simon's conclusions are as follows: "Because of the relatively small quantity of rectifier locomotives involved, the most economical application of a d-c traction motor on rectified single-phase, 25-cycle power is one that employs a standard production-type motor with sufficient series reactor to properly limit the ripple. Motors possessing inherent load characteristics that permit the use of a reactor that saturates with load have definite advantages for such applications. A further development that would benefit this type of power transformation includes d-c motor operation on rectified 60-cycle power."

"Thermal Stability of a New Insulating Material Used in Traction Motors" is the title of a paper presented by R. W. Finholt, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa. Mr. Finholt outlines the requirements of traction motor insulation as follows:

"Modern traction motors operate under severe conditions. The latest adopted standard for traction motors lists them as Class B according to the 1943 AIEE Standard No. 11 and the ASA C35.1-1943. This provides that the peak value by resistance of the armature shall not exceed 160 deg C, and the peak value for the fields shall not exceed 170 deg C. Modern traction motors on heavy diesel-electric locomotives often exceed these temperature limits by 20 to 30 deg C. The temperatures in the hottest part of the armature and the hottest part of the field will exceed these average resistance measurements. Coupled with these high temperatures are severe vibration conditions, dust, water, varying humidity, highly variable maintenance and shock. Most traction motor equipment operates on 3,000 volts or less on direct current, or 1,500 volts or less on alternating current. The railroads expect and get long motor life coupled with a very high degree of dependability.

"A general problem in insulation is that of high temperature combined with a number of mechanical destructive factors. In the search for better materials, tests have been run on the high-temperature materials that have become available in the last 15 years. One of these, in particular, has proved to have such excellent properties, both physically and economically, that the General Electric Company is adopting it widely for use on traction motors. This new material is known as mica mat."

The form of mica mat found most useful in traction motor insulation is impregnated with silicone resin. It is used both as wrappers on armature coils and as tape on field coils. The first heat tests made on mica mat were made on flat sheet heat-aged at 250 deg C for five days. Mica mat sheets impregnated with alkyd resin, with silicone, and with several polyesters were tested. At the end of a week only the sheet that had been impregnated with silicone retained its original properties. The other sheets had become brittle, mechanically weak, and had all but lost their original dielectric strength.

Extensive straight thermal testing showed that mica mat had properties far in excess of those actually needed for the operation.

Tests made combining heat and pressure showed that silicone-treated flat sheet material which is used as a wrapper on armature coils has a crush resistance of about 10,000 psi at 200 deg C. The glass-backed tape has a crush resistance of about 3,000 psi at 200 deg C. These values are both lower than the 18,000 psi of the mica tape which they replace, but they are satisfactory for most normal use.

Life tests involving high temperature and extreme vibration demonstrated that mica mat was a better insulation than copper was a conductor at high temperatures, and that the limiting feature in a motor might not be the insulation, but the copper.

Field tests, now running into the fourth year have made it evident that mica mat is not simply an adequate substitute for mica tape on armature coils, but rather a superior insulating material. It is at once lower in cost, gives more uniformly shaped coils, will stand more heat and vibration and is somewhat easier to use in the factory.

Mr. Finholt also adds a note of caution. He says: "On the other hand, field tests showed that mica mat was not a universal substitute for mica tape. At the present time,

it does not seem suitable for taping armature conductors, although it makes excellent wrappers for ground insulation on armature coils. Neither does it seem suitable for field coils where high pressures are exerted in manufacture or in use. As shown before, there are definite limitations to the pressures this material can stand. There are still other places where it has been found unsuitable because of mechanical deficiencies as compared to mica tape. Where properly engineered, it has turned out to be a most satisfactory insulating material for traction motors."

Power for Cars

A new d-c power supply for railway cars was described in a paper presented by E. F. Bredenburg, Locomotive and Car Equipment, General Electric Company, Erie, Pa. It consists of a d-c generator and a three-phase a-c standby motor similar to the equipment supplied previously by the General Electric Company and differs primarily because of the control equipment used. The use of a separate exciter eliminates the need for a pole changer and the multiple-finger voltage regulator is replaced by two relays. The system is described more in detail elsewhere in this issue.

New Haven Rectifier Locomotives

Rectifier-type electric locomotives which receive 11,000-volt, a-c power from the contact system and employ d-c motors which operate on rectified a-c power were described in a paper presented by F. D. Gowans, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa. Delivery of 10 such locomotives to the railroad was begun in December 1954. They are described in an article which appeared in the February 1955 issue of *Railway Locomotives and Cars*.

During the discussion of the paper, a questioner wanted to know why the motors were arranged with two permanently in series, since the probability of wheel slip is less when all motors are in parallel. Mr. Gowans replied that transformers like voltage, and motors like current, a circumstance that leads to lower cost design when two motors are permanently in series.

The possibility of using germanium or silicon rectifiers was raised and the thought was expressed that such developments would definitely improve the prospects for more straight electrification.

Effect of M-U Cars on Communication Lines

Inductive coordination considerations necessary to prevent rectifier type m-u cars on the New Haven from causing objectionable interference to communication circuits were dealt with in a paper by L. J. Hibbard, Westinghouse Electric Corporation, East Pittsburgh, Pa., F. T. Garry, Southern New England Telephone Company, New Haven, Conn., and G. N. Loomis, New York, New Haven & Hartford. The paper was presented by Mr. Loomis.

Paralleling telephone and railroad communication circuits are for the most part carried in cables, but there are also some open wire lines. For test purposes, telephone circuits were used with the far end terminated in a balanced impedence to ground. Open wire circuits were connected to cable pairs that had been terminated in a balanced impedence to ground. Railway communication lines are supplied with drainage circuits.

Test results indicate the following facts: A large number of rectifier motive power units do not have a directly additive effect on each other. Multiple-unit rectifier motive power without a-c filters produces approximately the same noise levels as existing motive power under similar load conditions. Multiple-unit rectifier motive power with a-c filters produces lower noise levels than existing motive power under similar load conditions.

Bogies for Rectifier Locomotives

Design features which must be included in a rectifier-type locomotive if it is to meet railroad requirements are outlined in a paper presented by H. S. Ogden, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

The first of these requirements is that the locomotive be able to duplicate or exceed the performance of present locomotives equipped with 25-cycle commutator motors. Extensive stand tests showed that the motors can deliver these high horsepowers for short periods. The tests also indicated that motor commutation is sufficiently good to permit these high outputs to be attained with the expectation of reasonable commutator and traction motor maintenance.

In the process of working out a suitable design, it was necessary also to include such considerations as wave shape, rectifier connections, trolley voltage requirements, rectifier arc backs and telephone interference. Mr. Ogden concludes that the design features which should be incorporated in a rectifier locomotive to insure maximum performance with minimum weight and cost may be summarized as follows:

1. The traction motor should be a standard low-cost unit developed for diesel-electric locomotives.

2. Direct-current smoothing for the benefit of the traction motor is best achieved by an iron core smoothing reactor built large enough to take care of all requirements.

3. Rectifier tube circuit connections should be of the bridge type rather than the diametric type.

4. Firing circuits should be arranged for satisfactory operation over the maximum trolley voltage variations that will be encountered in service.

5. Main transformers should be built with optimum reactance for minimum weight and size. The additional current limiting reactance should be built into divided current limiting reactors, division being in accordance with the basic circuits of the rectifier connections.

6. Telephone interference problems are minor in nature and can be corrected by the addition of a relatively small RC type filter circuit across the rectifier input.

Graphic Aids to Locomotive Design

"Graphic Aids for Calculating Locomotive Performance" were developed by R. D. Charlton, General Electric Company, Erie, Pa., and presented in a paper by that name. The purpose of such a grahic study is explained by Mr. Charlton as follows:

The success of any product is often determined by its ability to give customer satisfaction when operated under a wide range of conditions. All too often, these conditions

differ appreciably from the specification upon which performance guarantees are based. To assure product satisfaction, the ability correctly to project knowledge of product behavior from known to unknown regions is essential.

Electric locomotives are usually sold to a specification, and performance is calculated over a given profile on the assumption that voltage at the trolley is the specification value. The accuracy of this assumption depends upon the system itself and the nature, magnitude and relative location of other system loads.

To be confident that a locomotive, as specified, will give satisfaction when applied, it is necessary to put the locomotive and the system together, early in the design stages.

In the process of designing some 11,000-volt, 25-cycle rectifier locomotives, it becomes desirable to investigate the locomotive performance, recognizing the effect of system constants and normal operating procedures upon locomotive performance.

Because graphic methods offer a way of organizing knowledge, to permit systematic extrapolation into unknown areas, a generalized graphical method was developed for calculating speed-tractive force curves. This method was calibrated by comparison with test values obtained for the same conditions.

In addition to determining performance, this method has assisted in visualizing the relative effect on performance of the several factors involved.

Effectiveness of the methods used were later verified by comparing the charted characteristics with those of the finished product. Accuracy of the method is indicated by the ratio of calculated speed to test speed. The difference between the two, ranges from one to three per cent.

An Electric Drive for Rotary Snow Plows

An electric drive for rotary snow plows is described in a paper by A. H. Hoffer and R. E. Willhite, both of the Locomotive and Car Equipment Department, General Electric Company, Erie, Pa. Power for the operation of the plow is obtained from a diesel-electric locomotive unit. The design of the rotor drive is extraordinary in that it makes 85 per cent of the power of the driving unit available to the plow over a wide variation of snow conditions. More about this in a subsequent issue of *Railway Locomotives and Cars*.

Power Supply for Railway Cars

By E. F. Bredenberg

Locomotive and Car Equipment Department
General Electric Company, Erie, Pa.

General Electric's improved axle-generator system has vibrating voltage regulator and exciter which eliminates the pole changer

■ The new rotating equipment consists of a 4-pole d-c shunt generator, a 6-pole exciter, and a 4-pole, 3-phase, 60-cycle, 220-volt induction motor assembled on a common shaft. The generator armature, fan, and a-c rotor are on a common sleeve to provide for a minimum pressing tonnage. This machine is driven either from a car axle through a drive unit and clutch or from wayside power through its induction motor. The generators are built for three voltage ratings, namely 40, 80 and 140 volts.

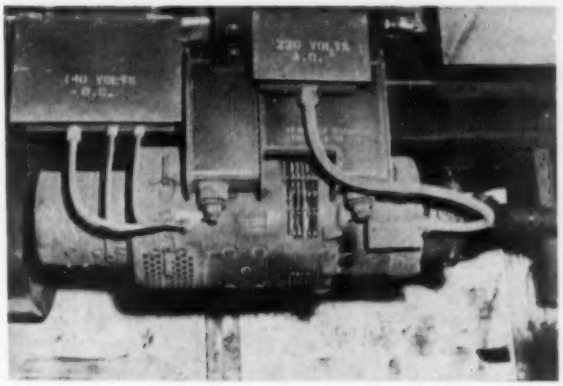
The control equipment includes an a-c panel, mounting line contactor, two overload relays, and an unloading relay. The d-c portion of the control equipment consists of a panel mounting a line contactor, a voltage regulating relay, a current regulating relay, a reverse current relay and a fuse or overload relay. Also mounted on a d-c panel are miscellaneous resistors, capacitors and rectifiers for control and stabilizing circuits.

When the generator and exciter are not running, current is fed from the battery through rectifier RT3 to the exciter field. Rectifier RT2 blocks this current so that it will not flow to the generator. As the set comes up to speed, the exciter builds up and excites the generator field. Because the exciter field polarity is always the same, the exciter armature polarity will reverse with a reversal of rotation of the set. Since the generator field is directly across the exciter armature, the generator field will likewise reverse with set rotation. Since both rotation and field current are reversed, the generator polarity will remain the same. An armature reversing switch is therefore unnecessary.

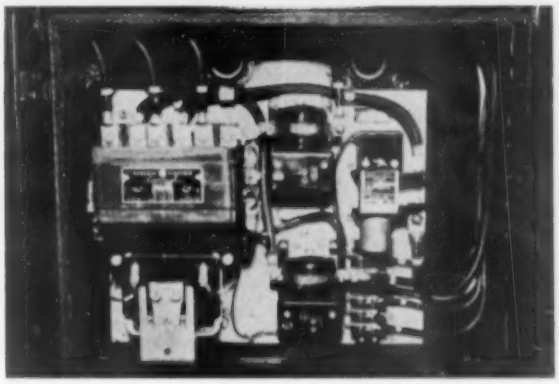
The reverse current relay is a simple two-coil relay having a series and a shunt coil wound on the same core. A knife-edge, counterbalanced armature carries the moving contacts. The fixed contacts are carried on a finger block which is mounted on the armature stop. There is one normally open circuit, the only purpose of which is to energize and de-energize the coil of the generator contactor. The only adjustment on the reverse current relay is a drop-out screw mounted on the armature.

As long as the generator voltage is higher than the battery voltage, the series coil of RC aids the shunt coil. When reverse current flows, the series coil bucks the shunt coil. This causes RC to drop out and open the generator contactor.

The voltage regulating relay (VR) has a single coil and a nonmagnetic armature. On the armature is mounted a movable contact bar which operates between two fixed contacts. Also mounted on the armature is a magnetic core plug that operates in the air gap at the center of the coil. A fixed core plug is mounted at the bottom of the air gap. The armature is held in its normal position by a spring. The adjustments of the movable core plug and the armature spring are sealed. The shunt coil is connected across the generator output in series with a resistor and rheostat. The rheostat is adjusted to set the relay to regulate the required battery charging voltage. The relay contacts are connected in the exciter field circuit.



The motor-generator set installed under a passenger car. Machines (left to right) are exciter, d-c generator and a-c motor



The a-c control panel is mounted in a box underneath the car

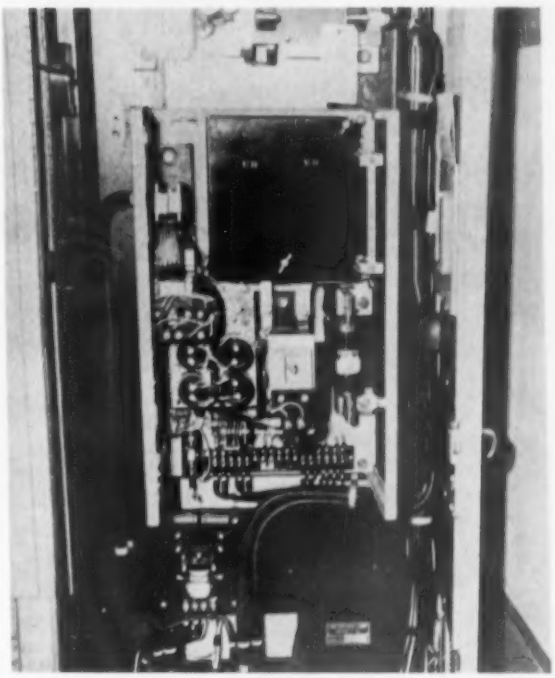
When the generator voltage rises to the value to be regulated, VR starts to pick up. This reduces the exciter field current and causes a corresponding decrease in generator voltage. VR then drops back to its original position. This action continues and the relay vibrates on its normally closed contacts. As the generator speed increases, the VR relay operates more in the open position than in the closed, and finally the contacts move to the other side and vibrate against the normally open contact.

The current regulating relay (CR) is similar in construction to the voltage regulating relay. It has two bias coils and a coil connected in series with the generator output. Again, the core and spring adjustments are sealed. When the line current reaches a predetermined value, the CR relay picks up and reduces generator voltage. This drops out VR. CR then takes over the operation of the system. Relay CR then vibrates against its stationary contacts to hold the proper amount of current.

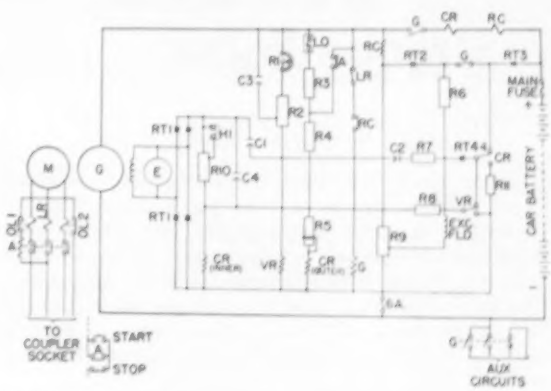
Rectifier RT1 provides for a constant polarity supply of exciter output voltage to the CR inner bias coil. As speed increases, exciter voltage decreases and current through the CR bias coil decreases, and the series current required to operate CR increases. This provides an increased generator current limit setting to take advantage of increased ratings as speed rises. Similarly, the CR outer bias coil, through an a-c line contactor interlock, adjusts the CR relay to a special wayside power current limit setting to protect both the a-c motor and the wayside power facilities.

Several stabilizing circuits are provided to give satisfactory operation over the complete range of speed and load. These circuits prevent hunting of the regulating relays and subsequent instability in the generator output. In short, when sudden system changes occur, the stabilizing circuits act to oppose the changes. Whether under steady state or transient conditions, the voltage and current regulating relays must be stabilized so that the moving contact will vibrate continuously against the fixed contact.

The equipment is designed as far as possible with an eye to the future. Current coils in particular are rated for use with low and high capacity generators. High and low settings of current limit are provided so that the same panel may be used with different generators. Devices have been selected to include as many common parts as possible for each of three voltage ranges.



The d-c control panel is mounted in a locker at one end of the car where it is readily accessible for inspection and adjustment



Simplified diagram of connections

This new design is largely a design of circuitry. To a great extent it has been possible to use proved circuit components. Because of the amplification provided by the exciter, the regulating relay contacts are applied at a volt-ampere level considerably below their rating. Capacitors and rectifiers, in particular, have been chosen conservatively to assure long life.

The low level of control power results in low temperature of the control locker and adds to the life of all equipment mounted in it.

As the regulating relay adjustments are sealed, the possibility of tampering and consequent maladjustment of the system is removed.

Design is such that individual components can be tested separately and installed without needing a system test.

The complicated voltage regulator has been replaced by two simple relays. These have a total of two double throw contacts instead of 20 contacts, and weigh only about 1/6 as much as the former regulator.

The armature reversing switch has been eliminated.

Shaft pressing tonnages have been greatly reduced.

Available speed ranges have been increased.

In brief, the equipment is characterized by simplicity, with expected long life and minimum maintenance.

A total of well over 100 of the new equipments have been delivered to several major railroads. Many of these have had months of operation and are providing reliable and satisfactory service.

From the Diesel Maintainer's Note Book . . .

Like a Man Lost in a Strange Forest

By Gordon Taylor

■ There are two methods of locating and correcting diesel troubles. By the first method you just start out trying this or that in the hope that you will do something that will somehow or other correct the trouble. That is the way that an Indian medicine man treats his patients. This method is not dependable. You are like a man lost in a strange forest without a compass. You are working in circles and need a compass to direct your efforts.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

In the case of diesel troubles, such a compass is a studied plan of action. In the second method, you use such a compass and carefully consider the symptoms of trouble. You think what you would do to cause the locomotive to act as it is acting. Then you plan your action to clear up the causes of that particular type of failure. If you are as familiar as you should be with the causes of different types of failures, you will find method No. 2 to be successful. The following is offered as a good example of trouble shooting by means of a studied plan of action.

What Happened

A three-unit EMD freight diesel was going about its business when the trailing unit failed to pick up load and it was a case of reducing load and setting out part of the train, or correct the trouble.

When the unit failed, the engine speed dropped to idle in throttle positions *2*, *3* and *4*. The engine would stop when the throttle was moved to Run *5* or Run *6*.

The crew started the engine up after it stopped, but could not get the speed up above idle speed. After trying this several times and losing time, the nearest round house point which fortunately was only twenty miles away.

As near as can be learned, the crew had checked the jumper cable and ground relay, but when they failed to correct the trouble, the crew needed help which they wisely called for.

When the maintainers arrived, they checked the symptoms of the trouble and in five minutes the locomotive was on its way again. The electrician followed a studied plan of action which quickly solved the problem. Here is how he went about it:

Problem: What causes an EMD engine to go to idle speed in Runs *2*, *3*, *4*, *7* or *8*; and what causes it to stop in Runs *5* or *6*?

Experience and study told the electrician that the *ER* relay was involved, for it is the function of that relay when de-energized to cause the engine speeds to act as they were acting.

Next Question: What could be causing the *ER* relay to be de-energized? The ground relay could have caused *ER* to open, but a quick check showed the ground relay

(Continued on page 104)

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FOR BETTER
RAILROADING

THE WINE RAILWAY APPLIANCE CO.
TOLEDO 9, OHIO

to be okay. The next thing was to consider all of the usual causes of a de-energized *ER* relay.

The functions of the *ER* relay as outlined in Operating Manual are as follows:

The *ER* relay on EMD units is located inside the engine control and instrument panel in the engine room.

It receives its orders to close from the no a-c voltage relay. It receives its orders to open from the ground relay, but its action may be interfered with by defective contacts in various parts of the control circuits.

Function of the ER Relay

For operation of the speed control in any one unit, the *ER* relay must be energized and closed. The relay has contacts which open when the relay is de-energized and they interrupt the circuits supplying the *A*, *B*, and *C* solenoids of the governor speed control. It has no effect on the circuit to the *D* solenoid. Thus, de-energizing the *ER* relay will cut out the *A*, *B*, and *C* solenoids and bring the engine to idle speed if the throttle is in runs *2*, *3*, *4*, *7*, or *8*. Should the *ER* relay become de-energized when the throttle is in run *5* or run *6*, the *D* solenoid will remain energized and cause the engine to stop.

The *ER* relays in the individual units are normally energized and closed by current received from the *FP* wire which runs throughout the locomotive. This wire is energized through the *PC* switch (or relay), fuel pump switch, and fuel pump fuse. The *ER* relay in each unit will become de-energized from any of the following causes:

1. Isolation switch not fully in *Run* position.
2. Failure of alternating current supply causing no a-c voltage relay to open.
3. Ground protective relay tripped.

The above three items were the ones that the electrician had to consider to get the engine speeds back to normal.

1. The ground relay had already been checked, so it was out of the picture.
2. The isolation switch was found to be fully closed. That dropped it out of the picture.
3. The no a-c voltage relay was checked. It was found to be closed, but the *AB* interlocks on it were burned and dirty. The interlocks were cleaned and the unit was back in business, all in the space of five minutes after planned action got to work.

Lesson to Be Learned

In discussing this case, the question was asked if it would have been permissible to simply block the *ER* relay closed. The answer is no. We do not want to start a practice of blocking relays that fail to operate in a normal manner. The idea is to restore them to normal condition. Suppose you blocked the *ER* relay closed. You would immediately lose the protection that ground relay is supposed to give. Also, you would lose the protection that the no a-c voltage relay gives.

Without these protective relays, heavy damage might result to traction motors and to engine.

There are many things that cause a diesel unit to drop load. Had the engine speeds remained normal, the most likely cause would have been some interference with excitation of the main generator.

Since the engine speeds were erratic the trouble was clearly not due to failure of generator excitation and thus called for a study of what causes an EMD engine to drop speed in runs *2*, *3*, *4*, and stop in runs *5* and *6*.

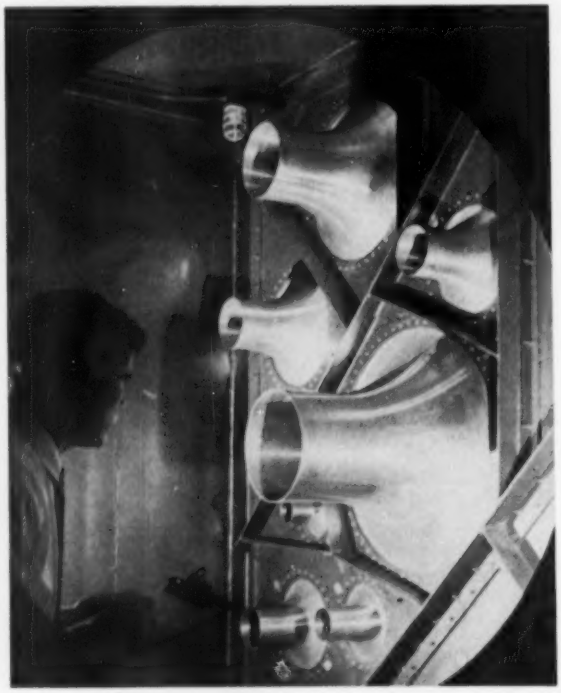
It is a lot more interesting to locate trouble by planned action, than it is to wander around in circles hoping that something favorable will happen.

Eliminating Shaft Currents

By W. E. Warner

■ The presence of local currents in shafts is often the cause of bearing trouble. The shaft is partially insulated by the oil film in the bearings. This is likely to break down, allowing induced or leakage currents to flow, which will cause pitting of the shaft, bearings and any connected gears. These currents are difficult to detect as they are only present when the machine is running.

The shafts can be grounded to the frame of the machine by means of a piece of springy steel. This has a hole drilled in one end, the other being welded to the machine frame. The steel is welded so that it extends over the shaft. In the hole in the free end is placed a piece of graphite brush, shaped to fit the hole firmly, which bears on the shaft. The springiness of the steel will insure good contact and good grounding.



Not tail pipes for moon rockets but calibrated air nozzles used in the General Electric Locomotive and Car Equipment plant laboratory to find ways of increasing the output of traction equipment within the design and size limitations of a locomotive. The nozzles and chamber are used as a part of a continuing study of air flow requirements of locomotive motors and generators and the effectiveness of different fan and blower designs

a number of shops on frisco lines now using paxton-mitchell safe-n-ezy washer-oilers

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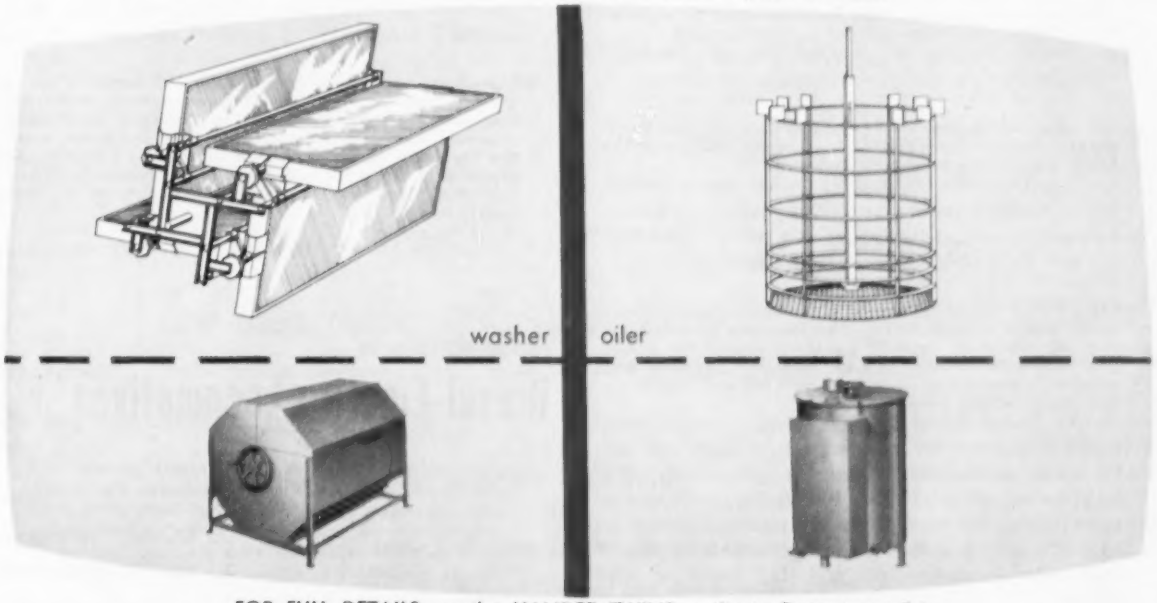
WASHER TAKES ALL filters up to 4" x 24" x 33". The oiler basket holds four filters up to 2" x 20" x 33"; three in sizes up to 4" x 24" x 33". Clips hold odd-size filters.

THE HAND-OPERATED WASHER is aided by roller bearings. The oiler, (also roller-bearing equipped), is started by hand; compressed air does the rest, including stopping. One non-skilled worker can operate both machines. Only 30 square feet of floor space needed.



FOR FULL DETAILS on the HANDEE TWINS write to Department 36.

PAXTON-MITCHELL CO.

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Questions and Answers

Interchange Rules

This is the fifteenth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

160-Q—What important freight car details now require either outright A.A.R. approval in some form or the issuance of specific A.A.R. Certificate of Approval before they can be used on cars which are intended for interchange service?
A—Metal running boards, draft gears, journal box lids, journal roller bearing grease, draft gear retainers and locks, brake beam and bottom rod safety supports, truck bolsters, truck side frames, coupler yokes and brake beams. Also, on and after January 1, 1956, automatic type slack adjusters which car owners elect to apply to interchange cars must be covered by Certificate of Approval.

161-Q—Is it generally intended that freight cars equipped with journal roller bearings shall be acceptable in interchange?
A—Yes. See note following Paragraph (j-1) of Rule 3.

162-Q—Are there any conditions under which cars equipped with journal roller bearings may be rejected by receiving road when offered in interchange?
A—Yes. Empty cars with defective journal roller bearing units may rightfully be rejected in interchange.

163-Q—Are there any specific allowances in the Interchange Rules where the cost of work performed by forces other than carmen is included?
A—Yes. The major portion of the allowance in Item 163 of Rule 107 covers the cost of having switch crew and weighmaster re-lightweigh cars prior to restenciling new light weight, etc., done by carmen.

164-Q—Where a foreign freight car is badly damaged in a wreck and it is estimated by the handling line that the cost of repairs to car will equal or exceed its A.A.R. depreciated value, less salvage, may the handling line arbitrarily proceed to dismantle such car and reimburse the owner for its net value?
A—No. Unless the car is totally wrecked and scattered to the extent that its parts cannot be assembled and loaded on another car and sent home, the owner must be given the option of either authorizing its retirement or requesting the handling line to make temporary or partial repairs and forward home on own wheels or load same on another car and ship home for disposition.

165-Q—Where handling line arranges to make temporary or partial repairs to a wrecked foreign car so it can be sent home on its own wheels, why is it important that proper estimate be made as to whether cost of repairs will be less or more than its depreciated value, minus salvage?
A—Because an improper estimate could result in loss of legitimate charge by the handling road up to $60.00 for the temporary or partial repairs.

166-Q—Why is it important for any road to send a representative from headquarters to scene of all wrecks of any consequence who fully understands all of the provisions and requirements of Interchange Rule 112?
A—So as to provide the kind of advice to those handling and clearing the wreck which will result in proper reporting and disposition of all foreign cars involved and thereby save the handling line needless expense.

167-Q—Is a railroad subject to penalty in some form where it elects to operate a loaded foreign car to destination having a wheel which has just reached the condemning limit for out-of-round or worn flange as outlined in Rules 73 and 74, respectively?
A—No. While also intended for guidance in the matter of safe operation of cars in trains as well as preventing undue wear on cars, the specific condemning limits for wheels as outlined in Rules 73 to 81, inclusive, need be strictly observed only where wheels are removed from foreign cars and bills therefor rendered versus car owners.

168-Q—What items of light repairs are generally made to freight cars in transportation yards by car inspectors?
A—It depends to some extent on the number of tracks which remain unaffected by switching operations for certain periods. However, in yards where conditions are favorable for such work and time will permit, items such as the following are renewed or applied: brake shoes, brake shoe keys, brake hangers and pins, brake head wear plates, air hose, air hose gaskets, cotter keys, journal bearings, coupler knuckles and pins.

169-Q—In view of the fact that Rule 101 requires the repairing road to allow the car owner certain credit percentages for various designs of defective draft gears removed, both approved and non-approved types, would the repairing roads be obliged to utilize all reclaimable portions of all such removed gears in definite draft gear rebilling programs in order to break even on their repair transactions?
A—Yes.

Fairbanks-Morse

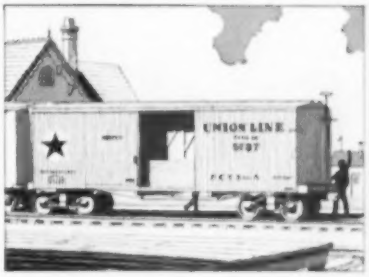
Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

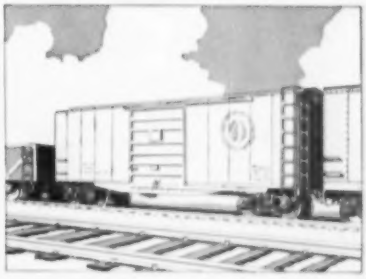
F165-Q—What is the trip setting?
A—The trip is set for approximately 950 rpm.

(Continued on page 111)

Time proves... Nailable Steel Flooring cuts railroad costs



At the turn of the century, when cars were mainly constructed of wood, frequent shopping for repairs was necessary.

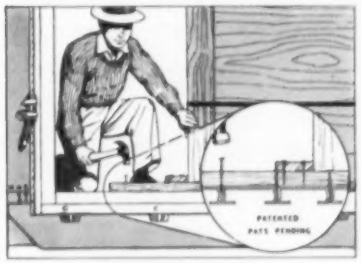


Steel was progressively used to give cars more strength and durability. An important part, the floor, was by-passed.

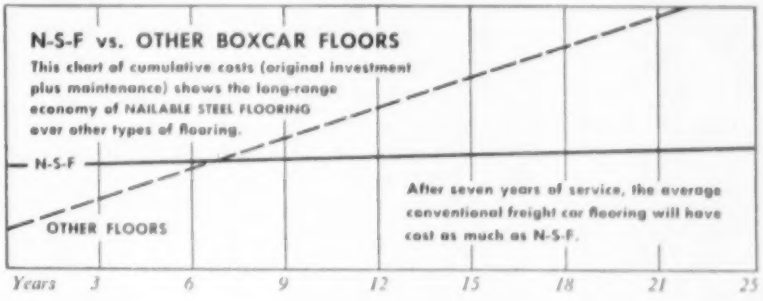
Some freight must be secured by blocks nailed in place, so that the nailability of wood kept it in use for car floors.

But such floors require frequent maintenance, increase operating expenses, and cut revenue earning potential. (See chart.)

N-S-F provides a positive means to cut maintenance costs and improve car supply —another forward step with steel.



N-S-F channels are made of low-alloy N-A-X HIGH TENSILE steel welded together to form a unique nailing groove. Nails are gripped tightly to improve blocking security, yet can later be readily removed.


N-S-F vs. OTHER BOXCAR FLOORS
This chart of cumulative costs (original investment plus maintenance) shows the long-range economy of NAILABLE STEEL FLOORING over other types of flooring.
N-S-F
OTHER FLOORS
After seven years of service, the average conventional freight car flooring will have cost as much as N-S-F.
Years 3 6 9 12 15 18 21 25

COMPLETE engineering and cost data available from Great Lakes Steel Corporation, Steel Floor Division, Ecorse, Detroit 29, Michigan. Sales representatives in Chicago, Philadelphia, St. Louis, Atlanta, Omaha, Denver, San Francisco, Montreal, and New York.

Like many improvements, NAILABLE STEEL FLOORING costs more initially than the material it supplants. But substantial savings in maintenance begin immediately and its cost is progressively reduced.

So an investment in N-S-F helps to improve operating ratio and pays off handsomely over a long period. It's easy to see why NAILABLE STEEL FLOORING is already in use in over 18,000 cars owned by more than 55 railroads.

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N-SF 108

New Locomotives for Old

—at less cost than you think!

In one door a 7-year-old F3 that has delivered over a million miles of heavy-duty freight service.

Out the other a locomotive that carries the performance rating of a new General Motors F9 *—and is backed by the same warranty as a brand-new unit.*

That, in short, is the story of Electro-Motive's program for rebuilding and modernizing work-weary Diesels.

Utilizing the world's most modern locomotive manufacturing facilities, Electro-Motive brings old units up to the latest standards *—higher horsepower, greater tractive effort and reduced maintenance*—with a substantial return on investment!

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American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

(Continued from page 106)

Fan and Shutter Controls

F166-Q—Where are the fan and shutter control switches located?
A—The control switches are sealed and located in a box on the left side of the wall near the engine room side door.

F167-Q—Where are the fan contactors located?
—The fan contactors are in two boxes located one near each engine room side door on the floor.

Sander Relay Valve and Cut-Out Cock

F168-Q—Where are these devices located?
A—Front truck sander relay valve and cut-out cock are located on the right engine room disc wall near the floor opposite the main generator. Those for the rear truck are located just ahead of the rear right sand box in the engine room aisle.

Hand Brake

F169-Q—Where is the hand brake located and where is it connected?
A—In the right rear of the unit and connected to the right rear brake cylinder of the rear truck.

Governor

(Bulletin 1706—101-A, page 27)

F170-Q—What type engine governor is used on these units?
A—The engine governor is of the Woodward Type P.G.

F171-Q—What are the features of this governor?
A—Electro-hydraulic speed control; built-in engine low oil pressure shut-down protection; built-in load regulator controlling resistance in exciter battery (4 pole) field; speed and fuel indicator scales on governor housing; overriding solenoid used to send load regulator to minimum field during wheel slip.

F172-Q—What does the governor speed control utilize?
A—Four solenoids, designated A, B, C, and D.

F173-Q—How are the solenoids energized?
A—Through four control train line wires running from the lead unit throttle through each unit.

F174-Q—How are the train line wires designated?
A—AV, BV, CV and DV.

F175-Q—What solenoids are energized at each throttle position?
A—Consult the table as shown at top of page 28.

F176-Q—How does the governor react to low lube oil?
A—If engine lube oil pressure falls below a pre-set amount for each engine speed, the governor will stop the engine.

F177-Q—What are the indications of the above condition?
A—Alarm bells will sound on each unit of the locomotive. The yellow "low oil" and blue "alternator failure" alarm lights will show on the engine control panel of the unit affected.

General Motors
Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G164-Q—What must be done before the engine can again be started, once the overspeed device is tripped?
A—It must be reset manually (by pulling the lever counter-clockwise until it latches).

Load Regulator

G165-Q—Where is the load regulator located?
A—Diagonally below the engine control panel.

G166-Q—What controls the movement of the load regulator?
A—Movement of the load regulator is controlled by engine lube oil directed the load regulator pilot valve and a dump valve (ORS) in the engine governor.

G167-Q—What is the function of the load regulator?
A—To automatically vary the battery field strength in the main generator.

G168-Q—What is the result of this action?
A—This action results in maintaining a power output corresponding to a definite rate of fuel consumption as determined by the position of the throttle.

G169-Q—What is the indication when the load regulator is in minimum field?
A—When the load regulator is in minimum field, the brush arm is in the 4 o'clock position.

G170-Q—What is the indication when maximum field is obtained?
A—Maximum field is obtained with the brush arm in the 8 o'clock position.

Hand Brake

(Manual 2310, page 120)

G171-Q—Where is the hand brake located?
A—Against the side of the car body near the air compressor in both A and B units.

G172-Q—How do you set the hand brake?
A—Turn the wheel clockwise as far as it will go.

G173-Q—How do you release the hand brake?
A—To release the brake, rotate the wheel counter-clockwise against the friction locks.

G174Q—What precaution must be taken before moving the locomotive?
A—Be sure that the brakes are completely released on all units.

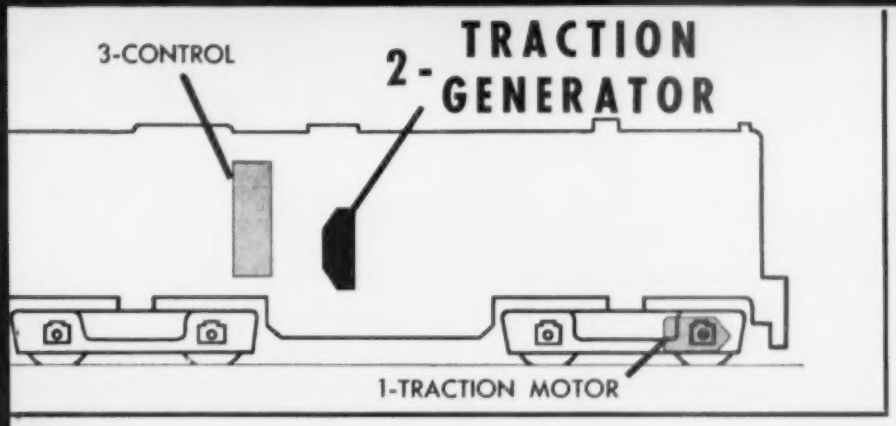
G175-Q—When should the hand brake be applied?
A—Whenever anyone is working around the locomotive trucks.

Control Air Pressure Regulator

G176-Q—What is the function of the Control Air Pressure Regulator?
A—To reduce the air from main reservoir to 90 3 lbs "control air" for operating power contactors, reverser and cam switch.

Highly versatile, G-E generators are equally adaptable to gear or belted auxiliaries and can be used with either solid or flexible engine coupling.
GENERAL ELECTRIC

3 REASONS WHY THE G-E TRACTION SYSTEM SETS THE INDUSTRY STANDARD



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HOW G.E. BUILDS TRACTION GENERATORS TO REDUCE LOCOMOTIVE ROAD FAILURES

Flashovers occur on all locomotives. However, road failures due to generator flashovers are practically unknown on locomotives equipped with G-E traction generators. In most cases, if a G-E generator flashes over, it simply recovers and the locomotive continues its run. This means less repair time and greater locomotive availability.

RUGGED DESIGN. Features that assure low flashover damage in G-E traction generators include: inherently high machine stability; mycalex brush holder insulators which unlike the porcelain insulators in other generators will not shatter during flashover; and, a brush holder shield that drastically reduces damage to the brush rigging.

SIMPLE CONSTRUCTION. G-E traction generators are simple in construction. They are self-ventilated machines and do not require separate blowers. While other machines have as many as six field windings, the G-E generator has only three—a real contribution to easier maintenance.

Ask your G-E Apparatus Sales Representative for more information about this generator—one of the superior components of the traction system that sets the industry standard. For G.E.'s new color film "The ABC of Flashovers" write Section 115-4A, General Electric Company, Schenectady 5, New York.

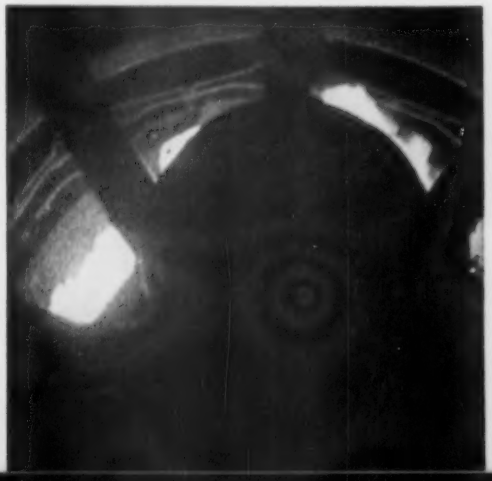
Progress Is Our Most Important Product

GENERAL ELECTRIC

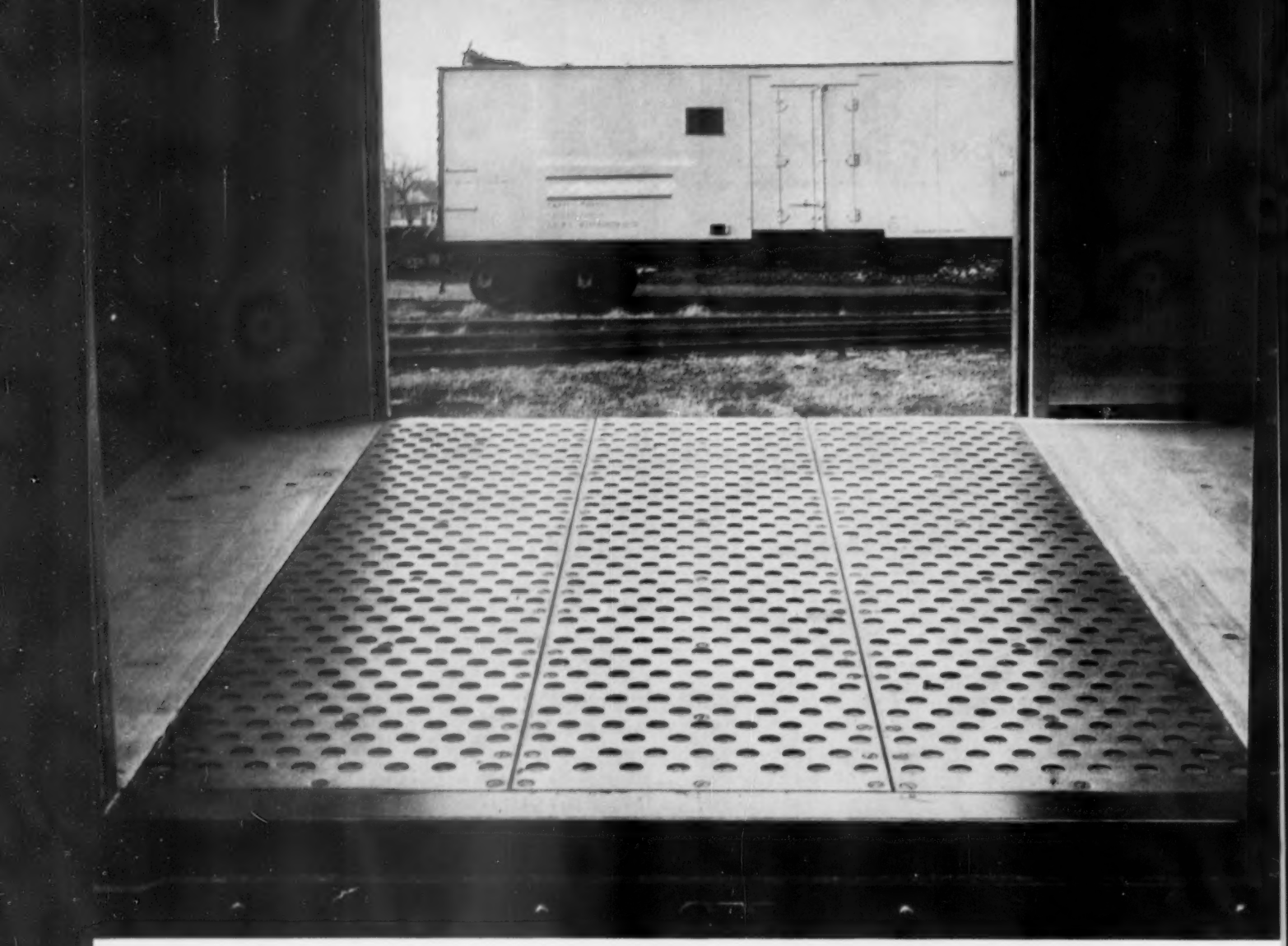
These high-speed photos from G.E.'s revolutionary film, "The ABC of Flashovers," show accurately what happens when a generator is flashed over.

1. The flash begins its path over the commutator of a standard production generator.

2. Chain-like reaction next occurs as conductive gases erupt and blaze across the entire commutator.



3. Climax is reached in violent explosion. Generator took over 400 flashovers in test.



THIS **Standard** METAL FLOOR PROTECTOR IS FREE!

Here is a STANDARD RAILWAY component that costs nothing. Seventeen years ago, this metal floor protector was put into a new car. Today that car is scrapped, but the *Standard Metal Floor Protector* has gone into a rebuilt car!

Free? How many times do you re-floor a car at the doorway in seventeen years? The original car carrying this floor-protector was never re-floored—nor will its successor be. We think this Standard Metal Floor Protector is making money.

Standard

RAILWAY EQUIPMENT MANUFACTURING COMPANY

GENERAL OFFICE: 4527 Columbia Avenue, Hammond, Indiana

New York • Chicago • St. Paul • San Francisco

MANUFACTURERS OF—Standard Improved Dreadnaught Ends—The Standard Diagonal Panel Roof—Standard Metal Floor Protectors—Standard Coupler Operating Device—Standard Positioning Device with Coupler Height Adjustment—and The Standard Wheel Truing Machine.

Standard *Railway Equipment Manufacturing Co., (Canada) Ltd.*

Sun Life Building, Montreal

FRISCO

Congratulations

to the St. Louis-San Francisco —an example of Mechanical Department efficiency!

We are proud to count the Frisco among our customers.

NOW YOU CAN

RENT OR BUY

THIS FAMOUS BRASS TRIMMER!

The trimmer that saves thousands* and thousands of dollars a year!

Used at periodical re-packing time, the trimmer perfectly restores the oil grooves of journal bearings.

EASY TO USE

The most inexperienced man may perform the job at car side within three minutes.

BEARINGS BETTER THAN NEW!

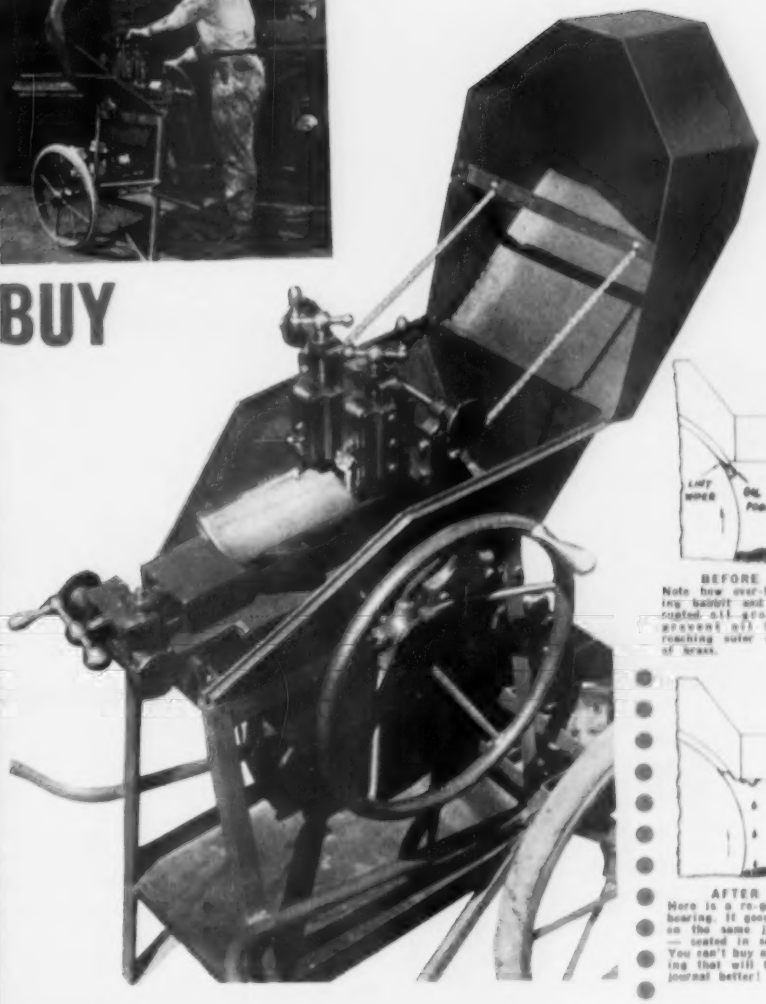
Trimming and reapplication to the journal from which removed results in the perfectly FITTED BEARING and eliminates the hazard of failure during the otherwise crucial break in period of a new bearing.

*SAVES APPROXIMATELY $5.00 PER CAR

Many years of service verify even greater savings.

A.A.R. APPROVED

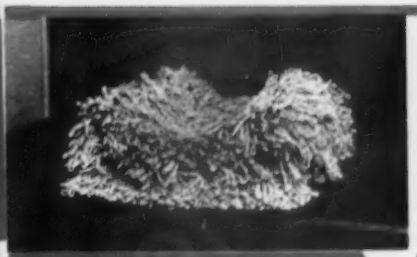
The trimming of bearings has been approved as a chargeable item on cars in interchange.



BEFORE
Note how over-hanging bearing and discoated oil grooves prevent oil from reaching outer edge of brass.

AFTER
Here is a re-grooved bearing. It goes back on the same journal — seated in service. You can't buy a bearing that will fit the journal better!

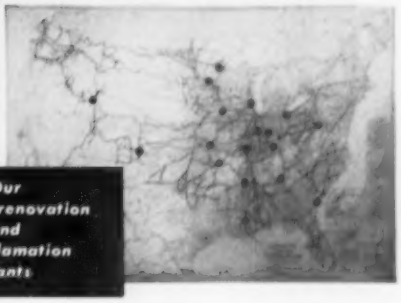
For greater reduction of hot boxes we recommend the new CHENILLE ROLL JOURNAL BOX PACKING.



Winter and summer tests show improved oil flow! Easier to apply! Economical! Reclaimable!

Available in all cotton yarn or wool—cotton yarn.

PACKING RENOVATION AND OIL RECLAMATION plants strategically located for quick service.

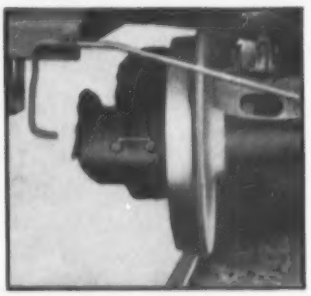


Our packing renovation and oil reclamation plants

JOURNAL BOX SERVICING CORP.

General Office: 1112 E. Kessler Blvd., Indianapolis 20, Ind.
Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.

Here's how Magnus improve freight



100 50'-6" Frisco box cars like the above are equipped with R-S Journal Stops. Inset shows end view of truck and hex-head bolts that secure the stops. Frisco box cars, series 7000 to 7099, were equipped with R-S Journal Stops as a result of extensive tests on 9 additional cars that established improved performance and maintenance savings.

Journal box with R-S Journal Stops after flat switching impact at 11½ mph. Packing is still in proper position. Compare with photos at right.

This CAN'T HAPPEN when you use R-S Journal Stops

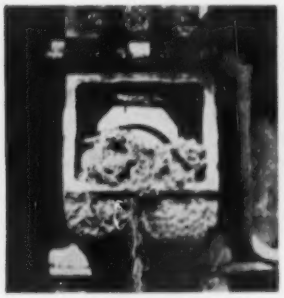
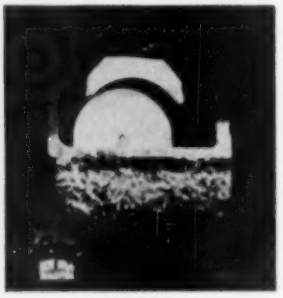


Photo of journal box at impact of 6 mph, showing how bearing is cocked off journal and packing is displaced.



When air and hand brakes are both applied, bearing and entire box are raised, compressing packing.

MAGNUS METAL CORPORATION

R-S JOURNAL STOPS
car performance

Three years service on the Frisco proves that this new development greatly reduces hot boxes, improves journal bearing lubrication, and cuts truck maintenance costs all along the line.

WITH MAGNUS R-S Journal Stops you can virtually eliminate hot boxes due to waste grabs. The bulk waste is always held firmly in position, and the bearing just can't be unseated to trap lint or short strands beneath the bearing crown. Because there's no packing displacement, oilers can service cars faster, too.

And because you hold the journal in its proper position, spread linings are prevented — and you get far longer bearing life. On the Frisco's first test car, *in 38 months there hasn't been a bearing replacement* — much less a hot box!

Improved Bearing Lubrication

R-S Journal Stops will make for constant bearing lubrication, too. Impacts or braking can't force the journal out of position — can't force the box to rise and compress packing. Without journal stops, whenever you have impacts or heavy brake applications, not only is the packing knocked out of position, it's squeezed against the underside of the journal. Then there's a definite loss in packing-to-journal pressures, a definite loss in lubricating ability of the packing.

But with journal stops, you avoid all that. Within given limits you maintain constant journal-packing pressures, and you supply a constant feed of oil to the bearing.

Many Other Maintenance Savings

To date all indications point to reduced and more uniform wheel flange wear when cars are equipped with R-S Journal Stops. But that's not all. You eliminate crushed dust guards and false brake piston travel. The prospects are for reduced center pin wear and a lower mortality rate for coil springs. That's why R-S Journal Stops can be used to real advantage with pad or mechanical lubricators or packing "containers." In fact, regardless of the lubricating method, R-S Journal Stops cut maintenance costs all along the line.

Easy Installation

You can apply R-S Journal Stops to any standard freight car journal box — either separable or integral-cast type. Installation is simply a matter of drilling two holes in each side of the box, inserting and bolting stops and shimming to proper journal clearance. Bearing and wedge can be taken out for inspection without removing the stops. To change side frames, you just remove one stop from each box.

Write us today for complete information. Magnus Metal Corporation, 111 Broadway, New York 6, N. Y. or 80 E. Jackson Blvd., Chicago 4.

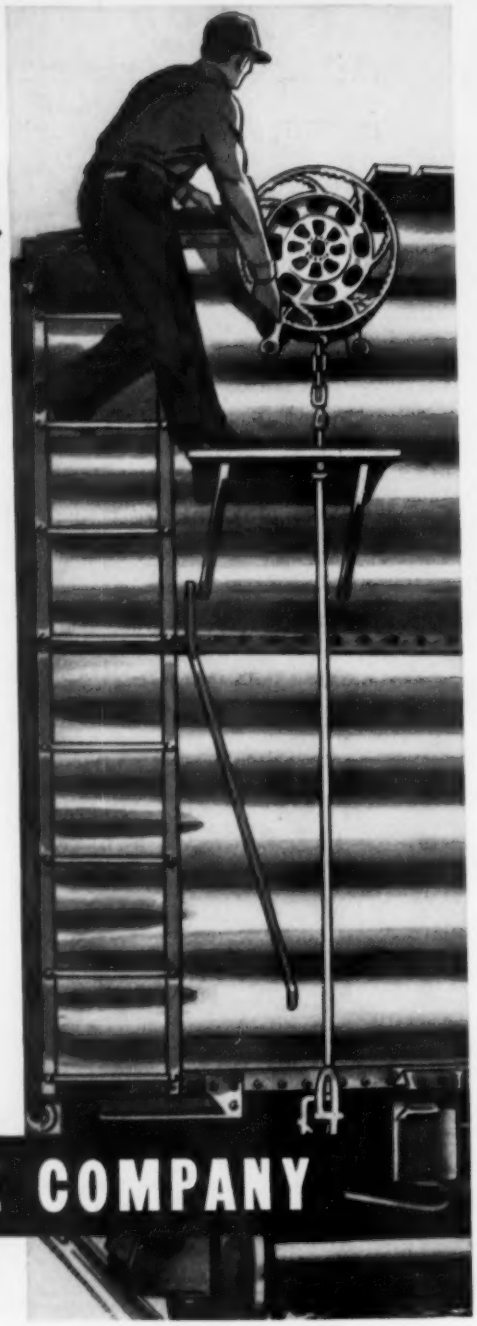
MAGNUS
Solid Bearings

Subsidiary of **NATIONAL LEAD COMPANY**

KLASING

POWER-MATIC NON-SPIN---▶ HAND BRAKE

A.A.R. certificate #27



• **Non-spin "easy grip" hand wheel** for operator's safety and convenience • **Fully controlled graduated release** by turning wheel counter-clockwise • **Quick take-up** for instant braking and positive control • **Easily released** under any power • **Operated completely with hand wheel,** no levers or gadgets for release • **Easily inspected—maintained,** all internal parts may be removed from the brake without removing housing from car • The speed, power and convenience of operation makes the POWERMATIC the most practical hand brake yet developed for manual control of freight cars.

FRISCO

CONGRATULATIONS TO THE FRISCO

for an outstanding mechanical operation! Klasing is happy to have played a minor role in your success! Best wishes for your continued growth!

Klasing's new Automatic Mechanical SLACK ADJUSTER is now available . . . Write for detailed information.

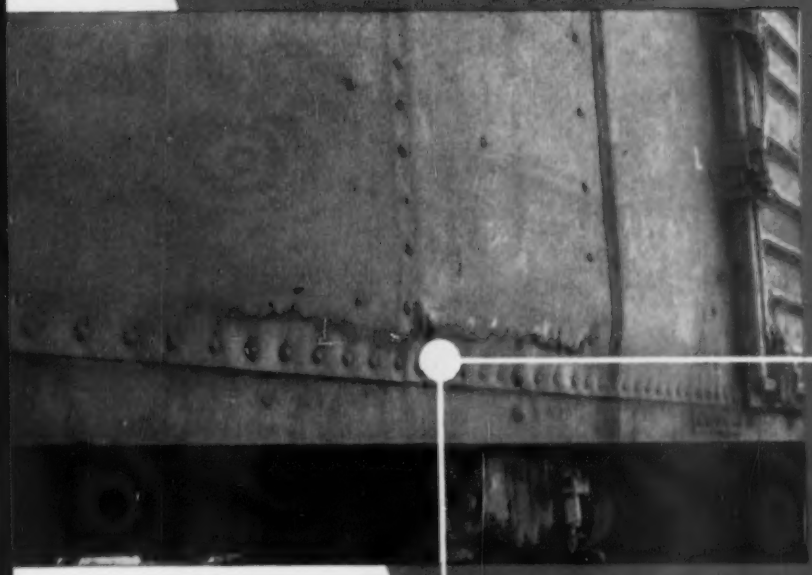
KLASING HAND BRAKE COMPANY

14 HENDERSON AVE. • JOLIET, ILLINOIS

CONGRATULATIONS

FRISCO

ON AN OUTSTANDING
MECHANICAL OPERATION



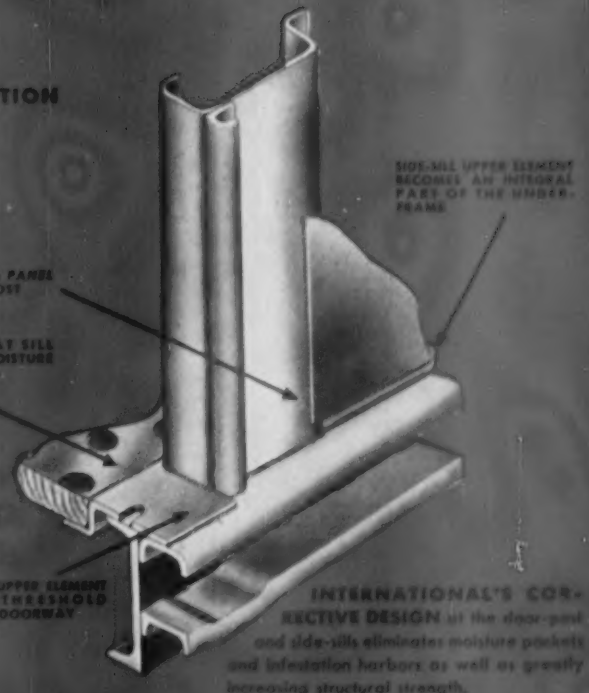
high speeds and rough handling didn't cause this!

INADEQUATE DESIGN AND OUT-DATED CONSTRUCTION DOOMED THIS CAR!

International

THERE'S A NEW PRECISION IN FREIGHT CAR CONSTRUCTION

● IT COSTS LESS TO ASSEMBLE A NEW CAR THAN TO REBUILD AN OLD ONE . . . and to continuously repair and "re-patch" on the basis of old design merely ***perpetuates*** expense! ***International's*** **CORRECTIVE DESIGN** illustrated at the right demonstrates "the new precision in freight car construction" in just a small section of the ***overall redesign*** of freight car sides, doors, underframes and other components instituted at ***International Steel!***


SIDE-SILL UPPER ELEMENT BECOMES AN INTEGRAL PART OF THE UNDER-FRAME
DOUBLE-FLANGE PANEL WELDED DOOR-POST
FLOOR LEVEL AT SILL HEIGHT KEEPS MOISTURE FROM SIDES
SIDE-SILL UPPER ELEMENT FORMS THRESHOLD PLATE IN DOORWAY

INTERNATIONAL'S CORRECTIVE DESIGN at the door-post and side-sills eliminates moisture pockets and infestation harbors as well as greatly increasing structural strength.

INTERNATIONAL STEEL COMPANY RAILWAY DIVISION
EVANSVILLE 7, INDIANA

Six Years on the Frisco

Records are based on performance.

Here's the performance of Fairbanks-Morse switching locomotives in the Tulsa Terminal on the Frisco:

Fairbanks-Morse locomotives

. . . 12% of the terminal fleet
. . . 17% of the terminal switching
. . . at only 9% of the total fleet repair cost.

That's the record of Fairbanks-Morse performance that has contributed to the outstanding success of the Frisco.

Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • SCALES
ELECTRICAL MACHINERY • PUMPS • WATER SERVICE EQUIPMENT • MAGNETOS

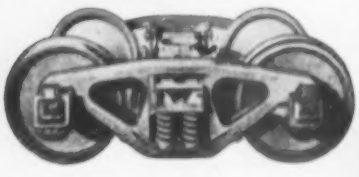
It's a Snap!

YOU SHOULD HEAR WHAT *CAR MEN* TELL US...

about the quick and easy servicing of Barber Stabilized Trucks.

Actually, in just a few minutes, they've got the Stabilizer parts out, when it's necessary to dismantle a truck for wheel changes or other servicing. Dismantling requires no bars, special tools, prying or other special labor operation. That cuts maintenance costs to the bone. Re-assembly is just as simple, then the Barber Truck goes rolling on again, smoothing out freight car rides... trouble-free because its stabilizing principle is so simple. Fewest possible parts.

Today Barber Stabilized Trucks are giving dependable service for over 100 major railroads and private car lines who have specified and purchased a total of over 352,000 car sets!
Standard Car Truck Co., 332 S. Michigan Ave., Chicago 4, Ill.
In Canada: Consolidated Equipment Co., Ltd.,
Dominion Square Bldg., Montreal 2.



Specify Smoother-Riding

BARBER
STABILIZED TRUCKS

For doing a great job . . .

Amcreco

extends its heartiest congratulations to the

FRISCO

our Friend and Business Associate of Forty Seven Years . . . .

Nearly fifty years ago, we signed a contract to supply creosoted wood products to the St. Louis-San Francisco Railway. The contract, one of the first signed by Amcreco, called for creosoting the entire supply of crossties for a period of ten years. To our great pride and satisfaction, this contract has been extended throughout the years and is still in force today.

We at Amcreco, and all others in the "fraternity of railroads and railroad suppliers," owe a debt of gratitude to the Frisco for its far sighted policies and for the technological advances that it has made in the betterment of American Railroading.

To our friend and business associate of 47 years, we say, "Well done and keep up the good work."

AMERICAN CREOSOTING COMPANY

Shreveport Creosoting Company
Colonial Creosoting Company
Federal Creosoting Company
Indiana Creosoting Company

AMCRECO LOWRY PROCESS CREOSOTED WOOD

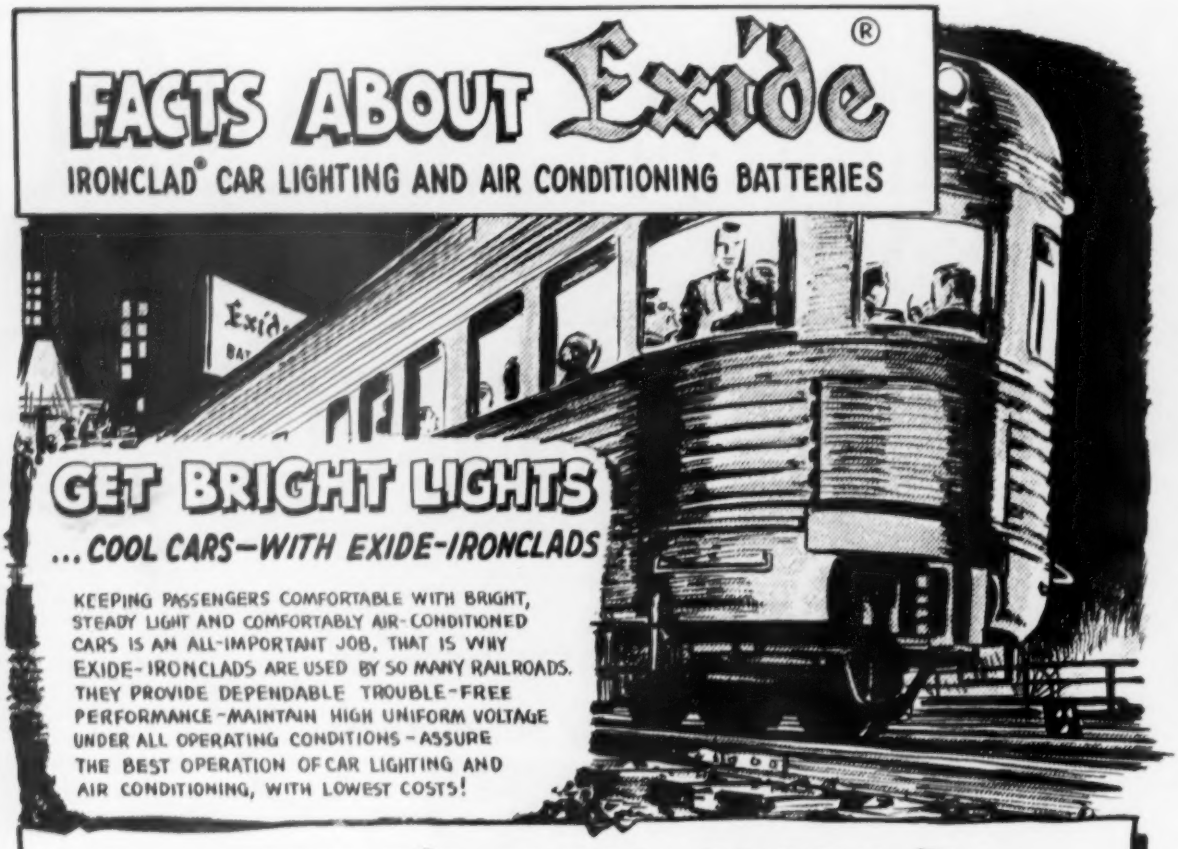
Georgia Forest Products Company
Gulf States Creosoting Company
Georgia Creosoting Company
Kettle River Company

LOUISVILLE 2, KENTUCKY
18 FIELD SALES OFFICES TO SERVE YOU

AMCRECO LOWRY PROCESS CREOSOTED TIES . . . POLES . . . PILES . . . TIMBER

FACTS ABOUT Exide®

IRONCLAD® CAR LIGHTING AND AIR CONDITIONING BATTERIES



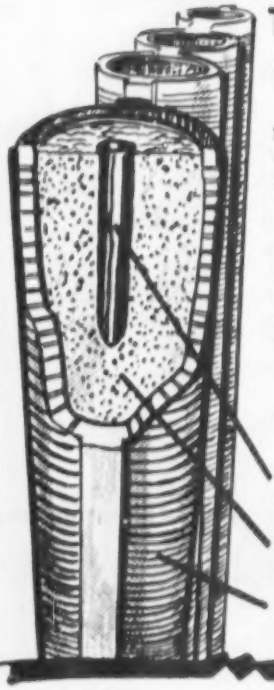
GET BRIGHT LIGHTS

...COOL CARS—WITH EXIDE-IRONCLADS

KEEPING PASSENGERS COMFORTABLE WITH BRIGHT, STEADY LIGHT AND COMFORTABLY AIR-CONDITIONED CARS IS AN ALL-IMPORTANT JOB. THAT IS WHY EXIDE-IRONCLADS ARE USED BY SO MANY RAILROADS. THEY PROVIDE DEPENDABLE TROUBLE-FREE PERFORMANCE-MAINTAIN HIGH UNIFORM VOLTAGE UNDER ALL OPERATING CONDITIONS-ASSURE THE BEST OPERATION OF CAR LIGHTING AND AIR CONDITIONING, WITH LOWEST COSTS!

NATURE'S IDEAL SHAPE

THE CIRCLE WORKS FOR YOU INSIDE AN EXIDE-IRONCLAD



SLOTTED TUBES INSIDE AN IRONCLAD KEEP ACTIVE MATERIAL IN FIRM CONTACT WITH CONDUCTING GRIDS OF THE POSITIVE PLATE. THIS GRID PROTECTION LENGTHENS LIFE OF THE BATTERY. THE SLOTTED TUBES EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... FOR GREATER POWER. FINE TUBE SLOTS HOLD MATERIAL IN CONTACT WITH GRID LONGER... RESULT, THE IRONCLAD'S ABILITY TO LIGHT AND AIR CONDITION CARS FOR A LONGER PERIOD OF TIME. THAT IS WHY

EXIDE-IRONCLADS

ARE YOUR BEST RAILWAY BATTERY BUY-

AT ANY PRICE!

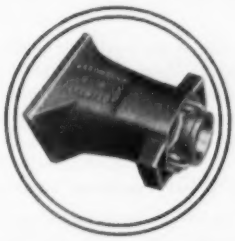
IRONCLAD POSITIVE PLATE

LET EXIDE HELP SOLVE YOUR RAILWAY BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 5010, A MANUAL ON MAINTAINING CAR LIGHTING AND AIR CONDITIONING BATTERIES.

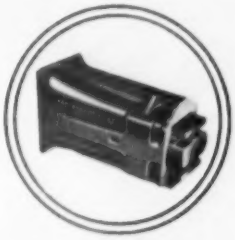
Exide INDUSTRIAL DIVISION. The Electric Storage Battery Company, Philadelphia 2, Pa.

CONGRATULATIONS TO THE FRISCO

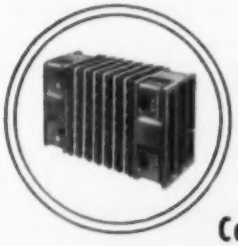
Cardwell Westinghouse Company has enjoyed its fine relations over the years with the St. Louis - San Francisco Railway Company, and wishes the "Frisco" every success as it "high-balls" on through continued achievement and progress.



CARDWELL V-18
Friction Draft Gear
(A.A.R. approved for cars of special construction)



WESTINGHOUSE
Friction Draft Gear
(Certified A.A.R.)



CARDWELL R-20
Rubber Draft Gear
(Certified A.A.R.)

CARDWELL
Friction Bolster Spring
(For use with A.A.R. standard and long travel springs)

Cardwell Westinghouse Co.
332 S. Michigan Ave., Chicago 4, Illinois
Canadian Cardwell Co. Ltd., Montreal

Specify
CARDWELL WESTINGHOUSE

New Air Brake Hose Lines Cut Costs 1/3 to 1/2

AEROQUIP FITTINGS ARE DETACHABLE ...USE THEM AGAIN AND AGAIN

Steel wire provides high burst and tensile qualities
Tough rubber cover resists effects of oil, weathering, sand blast and abrasion
Thick, oil-resistant inner tube
Designed for use with your standard gladhands
Heavy steel fitting can be removed and reused
T33309
L
188
188

Aeroquip announces a new type air brake hose line designed especially for diesel-electric locomotive and passenger car application.

Rugged and durable, Aeroquip air brake hose lines provide substantial savings over conventional types, with no sacrifice in performance. The fittings are detachable and may be used repeatedly for making replacement lines. Hose and fittings can be purchased in bulk and assembled quickly using standard shop wrenches . . . an important feature that means quick maintenance and greatly reduced inventory.

Some of America's leading railroads have already standardized on Aeroquip for replacement lines with anticipated savings of many thousand dollars. You can do the same . . . write for complete information.

For all Diesel-Electric Locomotives and Passenger Cars

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

For Maximum Revenue and Greater Availability!

Pulpwood Cars For the Progressive FRISCO Feature Cast Steel Underframes and Ends

The St. Louis-San Francisco Railway and other progressive railroads of America have built hundreds of pulpwood cars with COMMONWEALTH Cast Steel One-Piece Underframes and Upright Ends.

This type pulpwood car has many advantages over converted or other designs of cars. It provides maximum strength at minimum weight, assures longer life, greater availability and maintenance-free service. The one-piece cast steel underframe and upright ends simplify car construction.

These cars—especially designed for maximum revenue loads—are in service on a number of railroads and have proved a most profitable investment.

Commonwealth One-Piece Cast Steel Pulpwood Car Underframe with Interlocking End Posts applied.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. EDDYSTONE, PA.

GAIN THESE ADVANTAGES with MET-L-WOOD

METAL BONDED TO PLYWOOD

for new and rebuilt Passenger Car Interiors

FAST ASSEMBLY with Met-L-Wood, whether you fabricate in your shops or use prefabricated Met-L-Wood panels made to your exact specifications.

LIGHT WEIGHT Met-L-Wood panels can reduce weight to as low as 27% of the weight of comparable steel construction.

SOUND-DEADENING value of Met-L-Wood reduces outside noise levels, and is particularly valuable as sound-isolation when used for compartment partitions and doors.

VIBRATION DAMPING effect of Met-L-Wood helps prolong car life — gives passengers extra comfort.

and Smooth, Durable Beauty!

Whether plastic, painted steel, stainless steel, or aluminum, the smooth sweep of Met-L-Wood panels adds beauty to any car interior. Tough, abuse-resisting surfaces keep car interiors new-looking for years.

Details and technical data on Met-L-Wood panels, doors and partitions will be sent promptly on request.

Write for Bulletins 520 and 521

MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

on the **FRISCO**

MET-L-WOOD has proudly helped in the progressive modernization of cars

on the **FRISCO**

A HAPPY RIDER IS LIKE A MAGNET

. . . because he (or she) attracts more happy riders. That's why equipment that makes passengers happy and comfortable, like automatic air-conditioning and suitable lighting, must operate dependably. Simplex Car Wire helps make sure it does.

Simplex Car Wire is small in diameter for easy installation in less space and light in weight for convenient handling. Despite its small size and light weight, it sacrifices none of the qualities of long life, ability to withstand vibration, and resistance to abrasion, acids, heat, oil, and moisture.

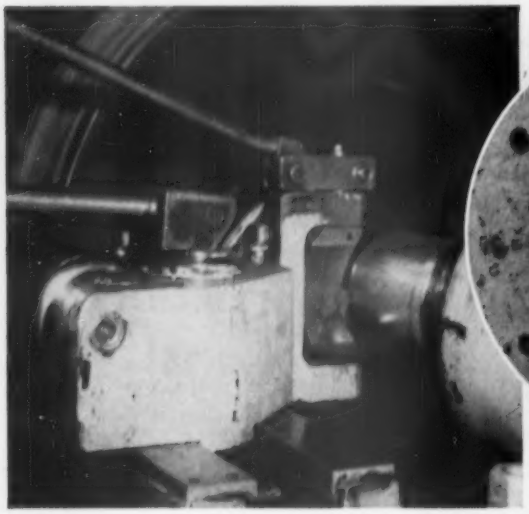
Simplex Car Wire is made with a special rubber insulating compound that readily withstands oxidation. It retains its physical and electrical properties even in the presence of water and extreme heat. A tough neoprene jacket protects it against service-encountered hazards.

To help insure reliable functioning of comfort-producing equipment for passengers, specify Simplex Car Wire. A letter to the Railroad Department at the address below, or an inquiry of your nearest Simplex representative, will bring more complete information. Write or call them today.

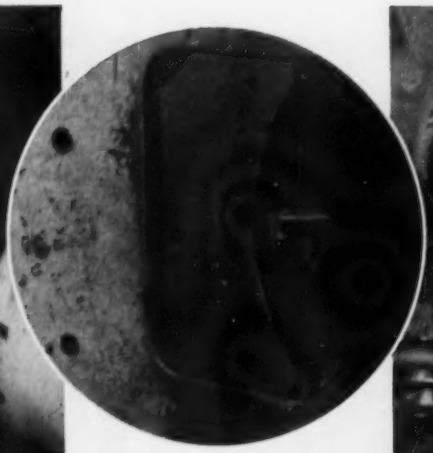
Simplex CAR WIRE

another product of

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

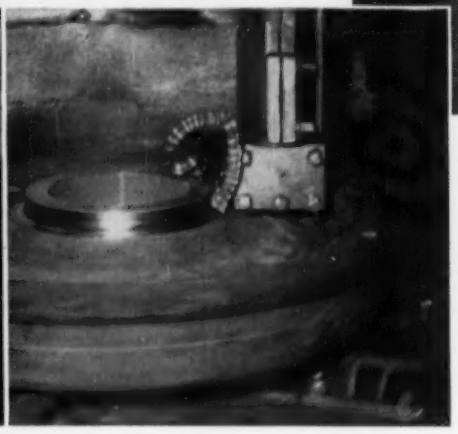


750-lb., 5½" carwheel being bored, using Kennametal WR and WF Standard Wheel Boring Tools, Grade K6.



Finish turning a FRISCO carwheel journal on a Sellers Axle Lathe, using Kennametal Grade K4H tooling. Insert: close up of the Kennametal Tool.

Burnishing wheel journal with a Kennametal burnishing tool.



Kennametal Clamp-On Tools are used on Niles Boring Mills to turn inside of rim, turn hub, and face flange.

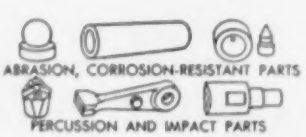
Here's how KENNAMETAL* Tooling is a part of THE FRISCO Story

The outstanding performance of the Mechanical Department of the St. Louis-San Francisco Railway Company is one that makes a story that is well worth telling. A part of that story—an important part, we feel—is the part that Kennametal Tooling has played. For, ever since it was first introduced, Kennametal has been used in different types of tools and various grades in many of THE FRISCO's shop operations, with the resultant increase in production and lower tool cost. A few steps in these operations are shown in the accompanying photographs.

The Kennametal tools used in these operations, also special tooling for machining axles and mounted wheel sets, have been developed after years of close cooperation with machine tool builders and railroad shops. Hence, Kennametal wheel and axle tooling is designed for the varied needs of maintaining railroad equipment. That is why leading railroad shops in all parts of the country have standardized on Kennametal carbide tooling for their operations. Send for a copy of our 20-page Railroad Wheel and Axle Tooling Catalog. KENNAMETAL INC., Latrobe, Pa. 5524

*Registered Trademark

INDUSTRY AND
KENNAMETAL
...Partners in Progress



NEW YORK AIR BRAKE Products Help Pace FRISCO'S Progress . . .

Modern, efficient equipment has played an important role in the steady advances made in mechanical operations on the FRISCO. Prominent among these items of equipment are New York Air Brake Company products, which are heavily represented on the FRISCO'S roster of diesel, freight and passenger units. These include not only New York's "AB", "HSC", "24-RL", "6-BL" and "6-SL" brakes but also such aids to efficiency as our brake cylinder release valves, "NYCO" sanders, "Type B" brake pipe flow indicators and "F-6" feed valves.

We have been privileged to work closely with the FRISCO in the furtherance of the best in railroading. To the Mechanical Department of this great railroad goes our heartiest congratulations and sincere wishes for continued leadership in this exacting field.

New York Air Brake Products Used by FRISCO

- AB Brakes
- HSC Brakes
- 24-RL Brakes
- 6-BL Brakes
- 6-SL Brakes
- NYCO Sanders
- Brake Cylinder Release Valves
- Type B Brake Pipe Flow Indicators
- F-6 Feed Valves

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.

Save Lading Save Labor!

WITH M-F WATER-TIGHT BOLTS

A flat, *flush* surface—*safe* for packaged or bagged lading—yet this added protection actually costs less *originally* (because the M-F Water-Tight Bolt requires no countersinking) and cuts car maintenance, too! (Because the water-tight ring prevents entrance of moisture and decay.)

MAC LEAN-FOGG *Lock Nut Company*

5535 NORTH WOLCOTT AVENUE, CHICAGO 40, ILLINOIS *In Canada:* THE HOLDEN CO., LTD., MONTREAL

LOCK NUTS • WATERTIGHT BOLTS • SPECIAL BOLTS • FLOOR CLIPS • LADING STRAP ANCHORS • STAMPINGS • STANDARD NUTS • THUMB SCREWS • TOOLS • DIES • PRESSED METAL PRODUCTS

RUST-OLEUM Protects Metal...

Saves Even Badly Rusted Surfaces!

The Practical Way To Cut Maintenance Costs — Add Extra Life To Rolling Stock, Bridges, Towers, Tanks, Metal Equipment!

Here's how easy it is to stop rust with RUST-OLEUM! Simply apply RUST-OLEUM by brush, dip, or spray directly over rusted surfaces . . after removing rust scale and loose particles by wirebrush and sharp scrapers. Costly sandblasting and chemical pre-cleaning are not usually required. Dries to a firm, elastic, durable coating. See how RUST-OLEUM can cut your maintenance costs. Specify RUST-OLEUM for all new construction, maintenance, repair or rebuilding.

In All Colors, Aluminum and White

RUST-OLEUM CORPORATION
2590 Oakton Street, Evanston, Illinois

RUST-OLEUM STOPS RUST!

Stopping Rust with RUST-OLEUM 769 D.P. Red Primer

Get Airco Inert-Gas Welding into your Production Picture!

Lower costs through quality and speed . . . that's Airco's answer to your production problem — even when the materials include aluminum, bronze, copper, nickel, stainless steel . . . all engineering metals.

The Aircomatic welding unit, for example, was researched and designed by Airco to produce top-quality welds . . . especially in "problem" metals and alloys without flux . . . with minimum plate edge preparation and little or no preheat. In performance, Airco's Heliwelding is similar — though engineered for high-speed welding of *thin* sections of metals — any metals.

And with the newest Airco addition to inert-gas-shielded welding, Aircospot, you can weld from one side of the joint — eliminating jigs and backup plates. Aircospot is the perfect primary tool for fabrication and no finer cost-saving tool for tack welding has ever been devised.

You'll want to learn more about how Air Reduction's inert-gas-shielded arc welding processes can serve you. Contact your nearby Airco Representative, Authorized Airco Dealer — or write Airco direct.

WELDING SHOW VISIT BOOTH 254

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

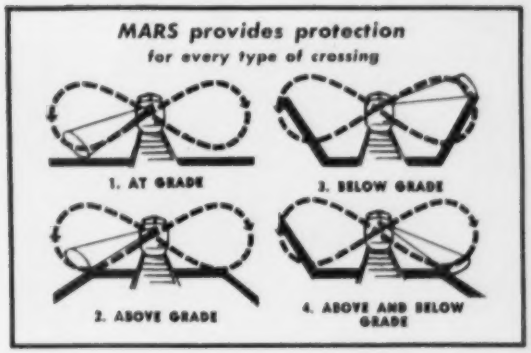
Represented internationally by Airco Company International

Foreign Subsidiaries:
Air Reduction Canada Limited,
Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON CHEMICAL COMPANY** — polyvinyl acetates, alcohols and other synthetic resins.

The FRISCO uses MARS Figure "8" Signal Lights for safety

One of 55 leading American railroads using MARS Signal Lights, the Frisco equips its passenger trains with front end and rear end MARS Figure "8" protection. The Frisco is now in the process of equipping freight locomotives with MARS Figure "8" Signal Lights as well.



MARS Lights describe 75 complete figure "8"s a minute or 150 flashes from the center of the light. This flash of white light on the head end gives a warning as trains approach crossings. A red signal is given when head end flagging is required. These insistent and unmistakable danger signals give every train a constant safeguard on the road.

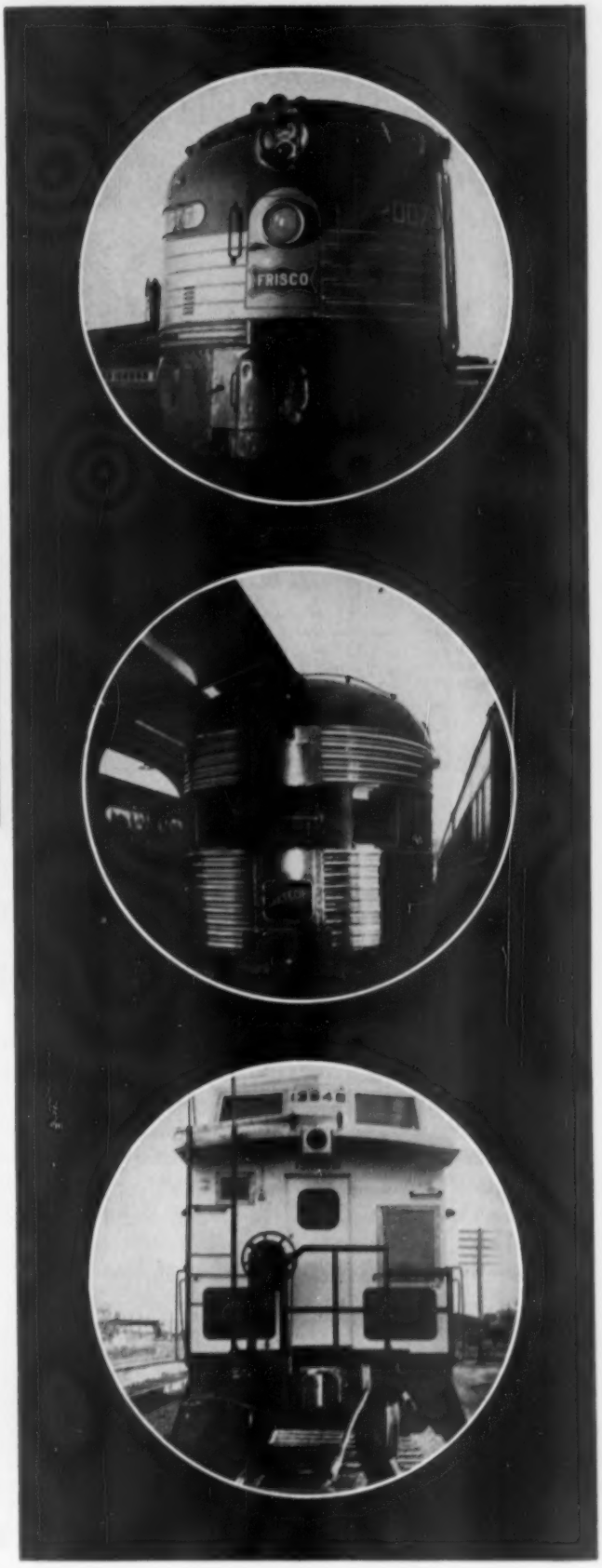
For the Best Protection Specify

1. MARS Sealed Beam Headlights
2. MARS Figure "8" Warning Lights for head end and rear end passenger car and caboose service.
3. Reduce your maintenance costs by installing MARS Sealed Beam Conversion Units in your incandescent-type lights.

All MARS Lights are guaranteed for 2 years against defective workmanship and material.

MARS
SIGNAL LIGHT COMPANY
4322 West Chicago Avenue
Chicago 51, Illinois
BElmont 5-1811

It's MARS Figure "8" from Coast to Coast



Above—Magnus Aja-Dip Cleaning Machine in the St. Louis shop of the Frisco Lines obtains thorough cleaning of diesel engine parts with savings of both time and labor.

Right—After tests of many cleaners, a special Magnus material was adopted by the Frisco for use in its mechanical locomotive washer to keep painted surfaces clean and bright.

The Progressive Frisco Lines Specifies Modern Cleaning Materials and Methods

The Frisco Lines can indeed be proud of its many contributions to the progress of the railroad industry that have brought it well-earned recognition. Its pioneering spirit will continue to make the Frisco foremost in the adoption of modern railroading practices.

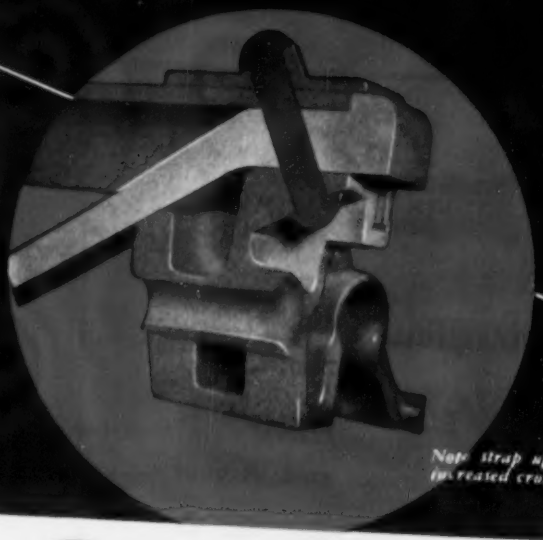
As a manufacturer of cleaning chemicals and equipment for the railroad industry, we hope that our products have in some measure contributed to the progress and achievements of the Frisco Lines.

The Magnus cleaning compounds and machines used in the shops and yards of the Frisco are successful, shop-tested materials and methods developed especially for cleaning, protecting and prolonging the life of modern railroad equipment. We are proud of the privilege of serving the Frisco Lines.

RAILROAD DIVISION

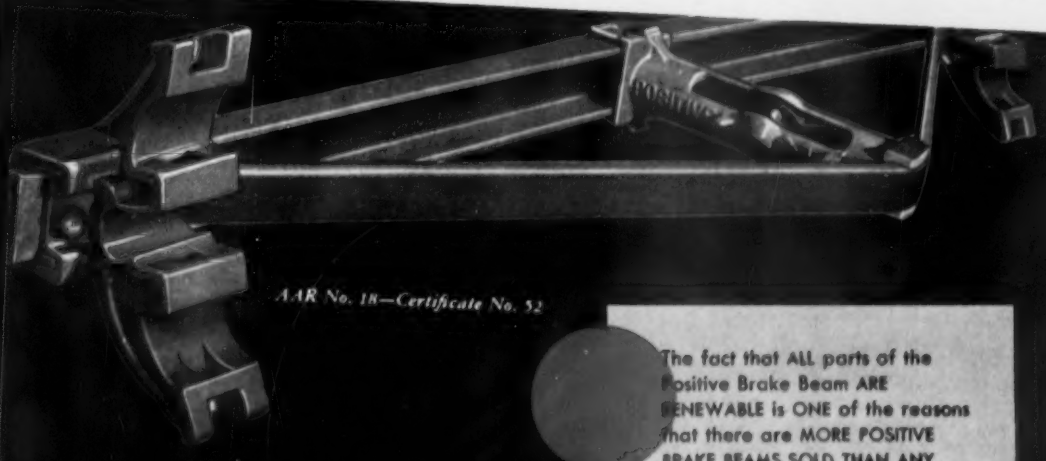
magnus
CLEANERS

MAGNUS CHEMICAL CO., INC.
77 South Ave., Garwood, N. J.
Service representatives in all principal cities



Note strap upset at rivet for increased cross sectional area.

ALL *Positive* BRAKE BEAM PARTS ARE RENEWABLE



AAR No. 18—Certificate No. 52

The fact that ALL parts of the Positive Brake Beam ARE RENEWABLE is ONE of the reasons that there are MORE POSITIVE BRAKE BEAMS SOLD THAN ANY OTHER KIND! There are other reasons, too . . . *Design* and *dependability* mean higher efficiency for operating men—lower cost on repairs and replacement. The *real* reason is: *real reasoning!*

CHICAGO RAILWAY EQUIPMENT CO.

332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

C-5

FRISCO

Our compliments to the Frisco on the successful performance and outstanding achievements of its Mechanical Department.

a salute

to

the

FRISCO

FOR HIGH STANDARDS OF MAINTENANCE

J. W. Mortell Company salutes the Frisco for excellence achieved in the high standards of maintenance of diesels, passenger cars, freight cars and shop operations.

J. W. Mortell Company is proud to be a supplier to the Frisco.

Many other railroads, too, know that rugged Mortex No. 4 and Railway Insulmat double the life of rolling stock, reduce maintenance costs and claims.

For information, write

J. W. Mortell Company

Dept. RD, Kankakee, Illinois

JW Mortell COMPANY

Technical Coatings for Home and Industry Since 1895

Makers Of These Other Quality Products

NoDrip NoDrip Tape Mortite

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FRISCO

Congratulations Frisco

WE are happy to have had a minor role in your success and hope that we may continue to serve you for many years.

MOZEL

CHEMICAL PRODUCTS CO.

3916 Geraldine Ave., St. Louis 15, Mo.

ALDON

UNIVERSAL CAR REPLACERS

ANY TWO MAKE A PAIR

ALSO DOUBLE-END AND SINGLE-END TYPES FOR ALL SERVICES

HEAVY-DUTY CAR MOVERS

THE ALDON COMPANY

DEPT. L-55

3338 RAVENSWOOD AVE. CHICAGO, ILL.

PERSONAL MENTION (Continued from Page 23)

ice engineer, Electro-Motive Division, General Motors Corporation 1937-41. In latter year became assistant to superintendent motive power, WP. Appointed assistant superintendent motive power in 1949, and assistant chief mechanical officer in December 1950.

Obituary

WALTER BOHNSTENGEL, who retired as chief test engineer for the Atchison, Topeka & Santa Fe on August 1, 1847, died at Topeka, Kan., last October.

GUSTAF A. OLSON, retired shop superintendent of the New Haven, died September 27 at his home in Chicago.

L. CLAYTON WALTERS, 64, assistant to vice-president, signal and electrical, of the Southern, died in Doctors Hospital, Washington, D. C., January 2.

SUPPLY TRADE NOTES

UNITED STATES STEEL CORPORATION, AMERICAN STEEL & WIRE DIVISION.—*Norman M. Sted* has been appointed assistant general manager of sales.

■

RAYBESTOS-MANHATTAN, INC., MANHATTAN RUBBER DIVISION.—*James Adams, Jr.*, has been appointed chief engineer, research and product design.

■

JOSEPH J. RYERSON & SON.—*Weaver E. Falberg*, assistant general manager of sales, has been appointed general manager of sales. *John A. Houston*, assistant

WORTHINGTON CORPORATION.—*Roland W. Bartlett* has been appointed manager of the Detroit district office. Mr. Bartlett was previously sales engineer in the company's Washington, D.C., district office.

■

EDGEWATER STEEL COMPANY.—Edgewater has opened a New York District sales office, in charge of *Daniel J. Mooney, Jr.*, district sales manager. Mr. Mooney formerly was with Great Lakes Carbon Corporation. *Scott Donahue*, whose sales agency has represented Edgewater in the New York area for many years, will continue in a sales advisory capacity.

ANNOUNCING . . . The most revolutionary achievement in ARC WELDING equipment in years!

BREN-WELD MODEL 200 AW

Weighs only 65 lbs.— Carry it to the job!

Patent Pending

Dimensions: only 11" x 12" x 7½"

FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

OBSOLETES ALL OTHER WELDERS OF COMPARABLE RATING

List Price $169.50 F. O. B. Long Island City, N. Y.

Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on the farm or home.

See your dealer or write direct for details of free trial offer!

24 hour delivery from stock!

KASSON

Manufactured by BRENNEN, BUCCI & WEBER, INC. New York City

SALES DIVISION KASSON DIE & MOTOR CORPORATION Integrity Since 1919 32-14 NORTHERN BOULEVARD, LONG ISLAND CITY 1, N.Y.

FRISCO

like other leading American railroads keeps it clean with Air-Maze filters

AIR-MAZE The Filter Engineers

AIR FILTERS • SPARK ARRESTERS • LIQUID FILTERS SILENCERS • OIL SEPARATORS • GREASE FILTERS

25000 Miles Road, Cleveland 28, Ohio

Weaver E. Falberg

sales manager of the Chicago plant, succeeds Mr. Falberg as assistant general manager of sales.

■

TIMKEN ROLLER BEARING COMPANY.—*D. G. Gibson*, assistant district manager, Dallas territory, has been appointed district manager, succeeding *Harry Trump*, deceased.

■

KERITE COMPANY.—*Theodore O. Rudd* has been elected president succeeding *C. R. R. Harris*, who has become chairman and chief executive officer, also retaining his post as treasurer.

Mr. Rudd joined the company in 1926 as a sales engineer. He was appointed to

Theodore O. Rudd

department manager in 1941, and named vice-president in 1945, and became a director in 1946.

■

NEW YORK AIR BRAKE COMPANY.—*Thomas W. Johnson* has been appointed director of engineering for the five divisions of New York Air Brake. Mr. Johnson was previously assistant to the executive engineering consultant.

■

JOSEPH DIXON CRUCIBLE COMPANY.—*H. E. Ehlers, Jr.*, industrial sales manager, has been appointed general sales manager. Mr. Ehlers has been succeeded by *R. C. Brock*, Pacific Coast district manager, who, in turn has been succeeded by *D. C. McMillin*, sales representative at San Francisco.

■

BEAVER PIPE TOOLS, INC.—*Charles T. Everett* has been elected president and general manager, as well as a director. Mr. Everett, before becoming associated with Beaver on May 15, 1954, as executive vice-president and general manager, was vice-president of the Bingham-Herbrand Corporation.

■

NATIONAL MALLEABLE & STEEL CASTINGS COMPANY.—*Roy C. Hobson*, assistant manager, has been appointed manager of the Chicago plant, and *Allan S. Bixby*, assistant manager, has been appointed assistant manager of the Melrose Park plant.

■

INTERNATIONAL NICKEL COMPANY.—*Albert P. Gagnebin* has been appointed assistant manager of the Nickel Sales Department and *Edward B. Bitzer*, assistant manager of the Nickel Alloys Department, both at New York. *Keith D. Millis* has been placed in charge of the Ductile Iron Section of the Development and Research Division at New York, succeeding Mr. Gagnebin, and *Howard N. Farmer, Jr.*, has joined the division as a member of the West Coast Technical Field Section at Los Angeles.

■

SUPERHEATER COMPANY, RAILROAD DIVISION.—The name of the Superheater Company Division of Combustion Engineering, Inc., has been changed to the Railroad Division of Combustion En-

FRISCO

Congratulations to the

FRISCO Mechanical Department

JENKINS

leather-fibre

JOURNAL BOX DUST GUARDS

Used on the FRISCO for over 20 years

Changes in the 1955 code of A.A.R. Interchange, Rule 66, paragraph B, prohibit the use of wooden dust guard plugs.

Specify

JENKINS Leather Fibre Dust Guards and Wedges

manufactured by

THE GEORGE O. Jenkins COMPANY

Distributed exclusively by

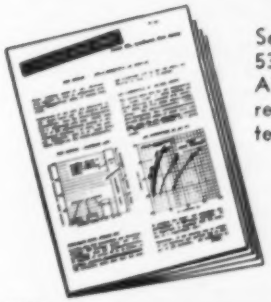
EQUIPMENT RESEARCH CORPORATION

64 E. JACKSON BLVD. CHICAGO 4, ILLINOIS

Agents in all principal cities

180 LESLIE-SUPERTYFON AIR WHISTLES ARE OUT IN FRONT FOR ONE OF AMERICA'S GREAT RAILROADS

LESLIE-SUPERTYFON 5-CHIME AIR WHISTLES KEEP A CLEAR TRACK AHEAD FOR FRISCO LINE'S DIESEL LOCOMOTIVES!



Send for Technical Data Sheet 531 describing Leslie-Supertyfon Air Whistles—performance, and results of diaphragm breakdown tests.

LESLIE® SUPERTYFON

3403

LESLIE CO., 275 Grant Avenue, Lyndhurst, New Jersey

NEW TOLEDO VISE STAND

a Sturdy Lightweight Work Bench!

BUILT-IN TRAY folds for easy carrying

Handy new Toledo No. 8 Vise Stand goes to any pipe-fitting job easily . . . sets up or takes down quickly . . . saves time and effort. All one unit, no loose parts. Extra rugged, won't fold up in use. Large size vise base for easy mounting of Toledo or other vises. 3 pipe benders, plenty of tool slots, pipe rest, ceiling brace. See it now—a great value at your supply house!

NEW TOLEDO PIPE VISE

***Exclusive* ROCKING-WEDGE ACTION JAWS**

Small Pipe from ⅛" | Larger Pipe to 2½" | Tees, Ells Valves

Grips any shape without crushing. Jaw action tends to eliminate marking of pipe. Heat treated jaws. Capacity—No. 1 Vise, ¼" to 2½". Order through your supplier.

THE TOLEDO PIPE THREADING MACHINE CO.
Toledo 4, Ohio

"TOLEDO"
TRADE-MARK REGISTERED

Builders of the World's Finest Pipe Tools

PIPE THREADERS
PIPE WRENCHES
POWER PIPE MACHINES

gineering, Inc. with offices in the Bankers Building, Chicago 3, and 200 Madison avenue, New York 16. *S. L. Brownlee*, who was manager of sales for the former Superheater Division, is now manager of the Railroad Division, with offices in Chicago.

■

ELASTIC STOP NUT CORPORATION OF AMERICA.—*D. E. Lally*, assistant general sales manager, has been named general sales manager, succeeding *E. F. Nason*, who has been made administrative assistant.

■

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY.—*W. E. Olds* has been named vice-president—sales, succeeding *J. E. Vaughn*, deceased.

W. E. Olds

H. L. Kent and *Arthur A. Franks, Jr.*, have been appointed assistant vice-president-district sales manager, of the Eastern district at New York and the Western district at Chicago, respectively.

■

JOY MANUFACTURING COMPANY.—*J. D. Russell*, manager of engineering, has been appointed vice-president of engineering, with headquarters in the Oliver building, Pittsburgh.

■

CHICAGO FREIGHT CAR & PARTS CO.—Under a new plan for the purchase and leaseback of freight cars the Chicago company would agree to purchase outright from a railroad or private car line any series of standard freight cars which are bad ordered or in need of periodic repairs, or cars for which no work funds are available. Cars so purchased would be repaired, either in the Chicago company's shops or in the road's own shops. In either case the company would pay the cost of such repairs. Repaired cars would then be leased back to the road from which they were purchased. They would carry the railroad's name and reporting marks.

Daily rental charges for the cars would be determined in each case by their cost to the Chicago firm, the amount of repairs required and the length of term of the lease. The firm believes such charges would be, as a general rule, substantially below the daily per diem of $2.40.

Once the cars have been leased back to the railroad, and placed in service, the carrier would have normal control over their use. All per diem and other earnings would accrue to the railroad.

The Chicago firm states that sale of bad-order cars by a railroad would provide new funds immediately for other uses. Rental charges, meanwhile, would constitute a direct operating expense and could be charged off against current earnings.

Obituary

WILLIAM CHARLES HANSEN, 60, president of A. Stucki Company, Pittsburgh, died on January 27 at the Johns Hopkins Hospital, Baltimore.

■

ERNEST W. DAVIS, director of engineering for the Simplex Wire & Cable Co., died on January 11 of a heart attack.

■

J. E. VAUGHN, 54, vice-president—sales of the Standard Railway Equipment Manufacturing Company at Chicago, died there December 20.

■

HARRY W. TRUMP, 63, southwest district manager of the industrial division of Timken Roller Bearing Company, died December 25 in Baylor Hospital, Dallas, Tex.

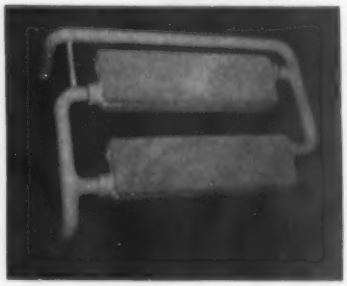
■

JOSEPH J. CIZEK, retired vice-president and sales manager of the Leslie Company, died on January 29 at Stuart, Fla.

FRISCO

Gets

EFFECTIVE AFTERCOOLING With WILSON Aftercoolers



Wilson Compressed Air Aftercooler

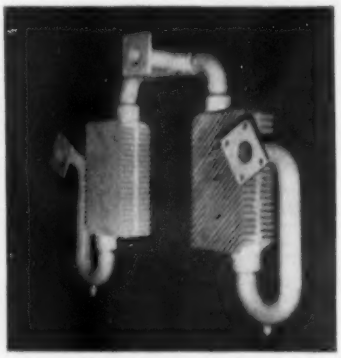
● The FRISCO Railway has equipped 24 of its newer diesel-electric units with Wilson Compressed Air Aftercoolers. As additional equipment, these rugged aftercoolers are mounted on roofs of the locomotive units—out-of-the-way, compact and performing with high thermal efficiency.

Wilson Radiation Elements are the heart of these aftercoolers. Integrally-cast in aluminum, these light-weight elements—with great inherent strength—offer exceptional freedom from maintenance and repair problems.

WILSON INTERCOOLERS

Wilson Compressed Air Intercoolers involve the use of the same radiation elements as described above. More than 1500 Wilson Intercoolers are in service today on locomotive units of 39 railroads—providing consistently reliable interstage cooling of compressed air for multi-stage compressors.

Especially severe these diesel-electric locomotive applications—yet *no Wilson Radiation Element has ever failed in service!*



Wilson Compressed Air Intercooler

Write for full information.

WILSON ENGINEERING CORPORATION

122 South Michigan Avenue, Chicago 3, Illinois

EQUIPMENT

(Continued from page 26)

and silicone insulation is used on all coils.

The fully-automatic arc force control is offered as optional equipment and provides an extra surge of current to blast away short circuiting metal drops which would otherwise freeze a short arc and cause sticking. The unit is suitable for difficult work such as pipeline root passes, vertical welding, low hydrogen jobs where a short arc and deep penetration are required.

Cooling for coils and rectifier stacks is provided by forced-draft ventilating fans. Designated 6WR30B, it is available for 220/440- or 550-volt operation. *General Electric Company, Welding Department, York, Pa.*

Power Unit

A complete, self-contained power unit, with a permanently mounted charger on the battery, can be charged by plugging into any 110-volt, 60-cycle power outlet.

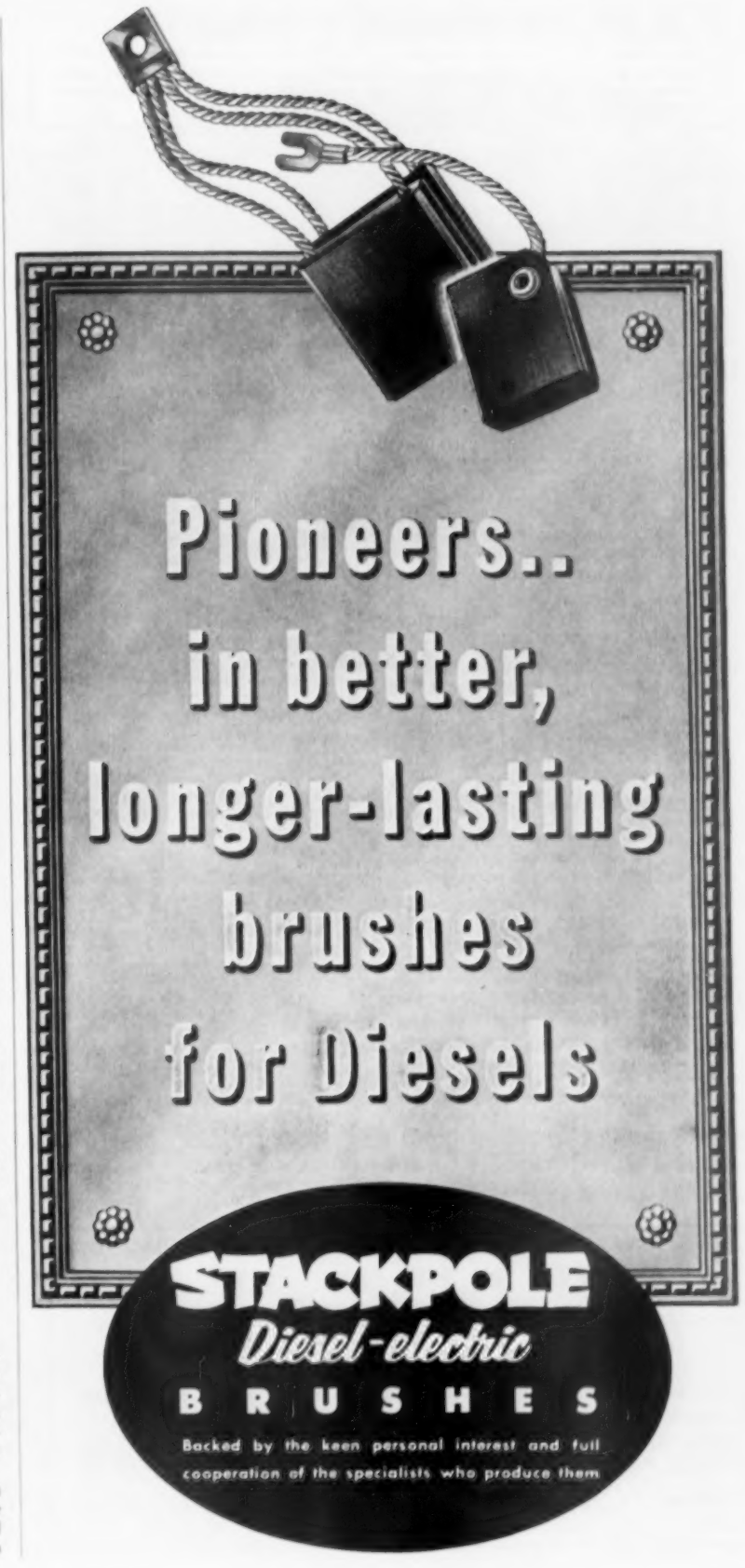
The battery remains on the truck and can be given a boost whenever the truck is not in operation. This battery charger can charge the battery overnight and be left on continuously without damage to the battery.

The top of the unit tilts back with the charger for easy access to the battery for adding water. The complete units are 26½ in. long, 7⅞ in. wide and 30⅝ in. high. *KW Battery Company, Inc., Skokie, Ill.*

Vapor Degreaser

Extremely compact, this unit requires minimum floor space and is reported to eliminate costly handling so common to degreasing of small metal parts. The device is a high production unit in which any combination of degreasing cleaning cycles may be incorporated.

The Vibra-Degreaser is equipped with a conventional type hopper. Small parts to be cleaned are loaded into this hopper and parts are drawn into the degreaser by an



Manufacturers' Literature

Following is a compilation of free literature, pamphlets, and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on coupon below to receive desired information; requests will be handled direct by manufacturers.

1. BATTERY CUBICLES. *Curtis Development & Mfg. Co.* 4-page 2-color bulletin (752) describes, illustrates and gives ratings for Curtis two-circuit battery charging and discharging cubicles for railway car lighting and air conditioning, diesel electric locomotives, and motive power service.

2. LOCOMOTIVE EQUIPMENT. *Viloco Railway Equipment Co.* 28-page laminated-finished-cover booklet describes and illustrates with in-action photos and diagrams the Viloco line of equipment for diesel, steam and electric locomotives—includes sander traps, valves, sand dryers, and lists of parts.

3. WATER TREATMENT. *Hall Laboratories, Inc.* 6-page pocket-size folder (290112) "Cooling Water" outlines the dangers of scale and corrosion in cooling system and organic contamination of cooling system water.

4. SAFETY EQUIPMENT. *E. D. Bullard Co.* 20-page Safety Equipment Catalog (55) gives data on all Bullard safety products with photos and technical details.

5. HEAT TREATING. *Metal Treating Institute.* 16-page booklet "Cost Accounting for Heat Treating" is a complete report of the MTI Cost Accounting Committee's efforts to develop a basic cost system adaptable to all types of heat treating operations.

6. PACKINGS AND GASKETS. *The Garlock Packing Co.* 20-page catalog (AD-148) gives complete design information, recommended pressures, and available materials for both dynamic and static applications of Garlock O-Rings.

7. FORGED STEEL UNIONS. *Watson-Stillman Fittings Div. H. K. Porter Co.* 4-page bulletin (U-1) describes, illustrates and gives dimensions of the new W-S Forged Steel Unions, both the screw-end and socket-welding types.

8. AIR REDUCTION. *Air Reduction Co., Inc.* 36-page profusely illustrated booklet "Facts About Air Reduction" describes in easy-to-read style the products and services of the various divisions; includes a history of the company, the process of reducing air, distribution facilities, and an organization chart.

9. JACKS AND PULLERS. *Templeton, Kenly & Co.* Bulletin (RR55) describes and illustrates the Simplex line of mechanical and hydraulic jacks and pullers, including trailer jacks and hold-down units for piggyback operations.

10. REFLECTIVE MATERIAL. *Prismo Safety Corp.* 4-page booklet (R-754) gives complete details on Prismo reflective marking materials and the Rain-Pruf Reflecto-Kit; includes in-use day and night photos, and application details.

11. MICROWAVE RADIO SYSTEM. *Westinghouse Electric Corp.* 8-page booklet (B-6393) gives a complete description of 2000-mc microwave-radio systems; features discussion of Type-FR microwave radio and Type-FJ multiplexing equipment.

12. OVERHEAD CRANE. *Whiting Corp.* 12-page 2-color booklet (Unit 80) "Presenting Whiting Engineered Cranes Designed For Better Performance at Lowest Cost" gives a complete presentation of the wide variety of handling jobs performed by Whiting overhead cranes; installation photos show cranes in action.

13. ADJUSTABLE SHELVING. *Standard Pressed Steel Co.* 4-page catalog-punched folder (2057) with photos, cartoons and text presents the features of the Hallowell Adjustable Steel Shelving.

14. V-DRIVES. *Worthington Corp.* 100-page Master Engineering Manual on Multi-V-Drives With QD Sheaves (V-1400-E2F) presents a scientific and simplified method for rating V-belts; each popular 60 cycle motor speed with complete drive selections shown on separate page.

15. ABRASIVES. *The Carborundum Co.* 42-page pocket-size booklet (14) "Abrasive Grain and Powders", with informative charts and illustrations, contains many of Carborundum's latest abrasive engineering recommendations; includes suggested layout for set-up room.

16. GRATING & STAIR TREADS. *Dravo Corp.* 16-page booklet (1105) describes and illustrates the complete line of Tri-Lok Interlocked and Tri-Forged Welded grating and stair treads, includes tables of safe loads and application photos.

17. HOISTS. *Ingersoll-Rand Co.* 44-page catalog (5300-A) describes the full line of I-R air and electric hoists; includes specifications, capacities, sizes, symbols and accessories of each type and size.

Reader Service Department — MARCH, 1955
Railway Locomotives and Cars
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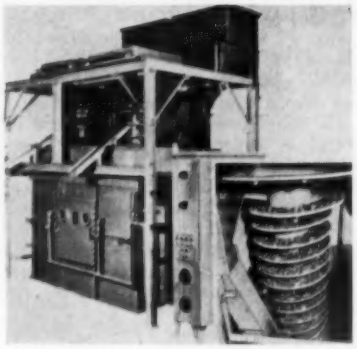


electro-magnetic vibrating feeder onto a spiral elevator. This spiral elevator carries the work up through the cleaning cycle to the discharge point.

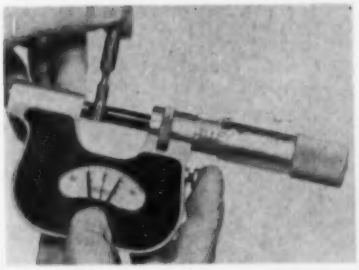
Moving parts such as chains, shafts, bearings, and sprockets have been circumvented in the design of the unit, eliminating wear and maintenance operations. Basic motive principal of vibration is claimed to maintain a constant flow of work into and out of the device, thereby eliminating overloading.

Solvent consumption is held to a minimum because the machine is totally enclosed. It is furnished with a complete control unit and requires either 220- or 440-volt, single-phase ac connections. It may be heated by either gas, steam, or electricity. *Manufacturers Processing Company, 1360 Hilton Road, Detroit 20.*

System Lubricator

A fully automatic lubricator which prolongs life of wheel flanges, switch points, frogs and rails for use on either diesel or steam locomotives, is designed to last for years with minimum maintenance. It is installed above the drive wheels and apply an accurately-controlled film of graphite-base lubricant to the throat of the wheel flanges by means of a slow-moving sprocket chain, powered by a friction type mechanism.

When utilized on a system-wide basis, sufficient lubricant is transferred from the wheel flanges to the pressure side of rails and to frog and switch points. By preventing "dry-steel", costly derails may be eliminated. *Rail & Flange Lubricator Co., 2784 N.W. Thurman street, Portland 10, Ore.*

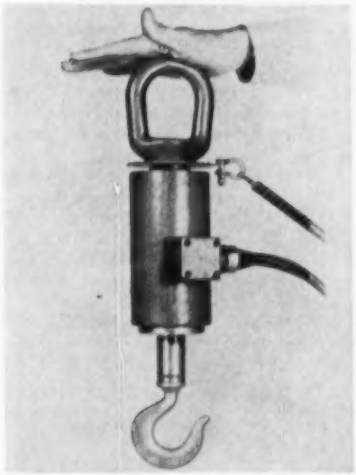


Indicating Micrometer

This device, said to provide "visible feel" to the user, has a range from 0 to 1 in., reading in 0.0001 in. increments. Readings of tenths are easily read from an extra large dial. The indicating mechanism controls the measuring pressure so that all uncertainties due to difference in feel of individuals are eliminated.

The Master Compar, as it is called, is a micrometer and comparator combined into one instrument. It also supplies the user with a complete set of Go and No Go gauges of 1 in. range, reading in 0.0001 in.

The unit is said to detect out-of-roundness, ovalness and taper. Resetting to zero is accomplished by means of a screw on the bottom of the housing and can be done accurately in less than 5 sec. Heavy tungsten carbide anvils and finished hardwood case are standard equipment. *George Scherr Company, Inc., 200 Lafayette street, New York 12.*



Crane Scales

Addition of three new standard sizes of SR-4 crane scales in small capacities has been announced. The new sizes are ½ ton, as illustrated, the 1½ ton and 2½ ton units. The manufacturer's line, with these additions, now includes six sizes ranging from ½ to 25 ton capacities.

These direct-reading load indicating instruments may be mounted in crane cabs, on carts, or in stationary positions. Cable reels provide freedom of movement of crane

WATSON-STILLMAN

Simplifies Piping Installation in Locomotive and Car Heating Steam Lines

Here's the ideal union for locomotive and car heating steam lines. It is readily installed in those hard-to-get-to locations beneath the frame. The clamp can be rotated so that the nuts are in the most convenient position for gripping and turning with a wrench. The union allows the pipe to be pre-fabricated and completely installed in the car frame. When used to join valves with matching ring faces, the W-S Clamp-Ring Union permits easy installation and removal of valves, and allows them to be rotated to any convenient position.

The W-S Clamp Ring Union is presently available in two sizes... for 2" and 2½" IPS pipe. The 2" union has socket-welding ends, whereas the 2½" union is available with butt-welding or screwed ends. Other sizes are available on application.

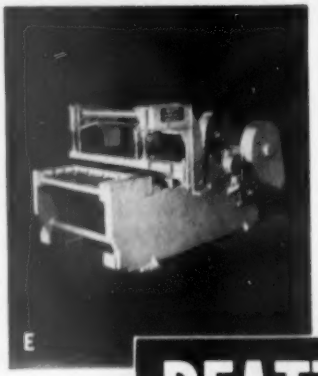
Sold through Leading Distributors

For information on the Clamp-Ring Union and other Watson-Stillman Railroad Pipe Fittings send today for Bulletin RR-1.

WATSON-STILLMAN FITTINGS DIVISION

HKP H. K. PORTER COMPANY, INC.
Roselle, New Jersey

R3



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We are pleased to join the entire railroad industry in saluting a pioneer line on the successful operation of their mechanical department. We are pleased, too, to even think that in some small way we may have contributed to their success and progress. Congratulations "FRISCO"!

A. BEATTY Co-Pun-Shear, one unit that does coping, punching and shearing without changing tools.

B. BEATTY Vertical Hydraulic Bulldozer for hot and cold pressing and forming of heavy metal.

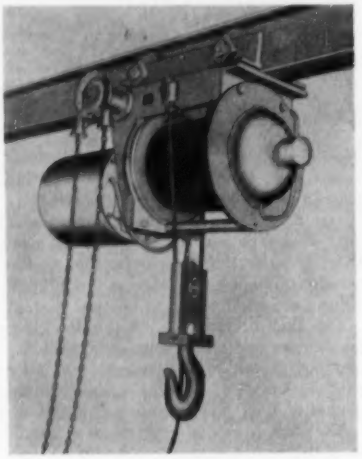
C. BEATTY Heavy Duty Punch that handles steel up to 65 ft. long. Punches webs, and flanges.

D. BEATTY Press Brake and Flanger handles any type of bending, forming, flanging, pressing.

E. BEATTY Horizontal Multiple Punch for line punching of vertical flanges.

BEATTY
MACHINE & MFG. CO.
HAMMOND • INDIANA

scales. High overload capacity protects calibration of the load-sensitive units. Overall length of the scales ranges from 18½ in. for the ½ ton unit to 5 ft for the 25 ton unit. *Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.*



Heavy-Duty Electric Hoist

Headroom of these 8- and 10-ton hoists, designed to handle heavy lifts, is approximately 37 in. The lift height is 15 ft and up. A choice of four mountings is offered: plain -trolley, hand-geared trolley, motor-driven trolley, and lug mounting. The mechanical brake with which each is equipped is stated to be advantageous in safe precision control of loads in the capacity ranges. It is constructed integrally with the hoist motor and gear reduction and automatically engages two cone-shaped, metal friction surfaces when power is broken in the motor circuit.

If the operator desires to "inch" the load up or down, a succession of quick touches on the up and down buttons will place the load exactly where wanted.

The hoist motors are of variable speed with single-speed control. They are of squirrel-cage induction type. Rotors incorporate a heat dissipating ring for localizing the heat of high-slip operation. Hoists of any capacity above 10 tons can be ordered. *R. G. LeTourneau, Inc., Longview, Tex.*

Thermostatic Pilot Controller

Unusually small in size, this controller is said to provide accurate temperature control of liquids or air when used in con-

junction with valves, dampers, and other controls. It is installed at the location where temperature is to be maintained. The device can be readily employed in control systems of electro-plating tanks, chemical vats and processes, water heaters and other applications.

Because of its rugged construction, the controller designated the Fultrol, may be installed in any position either vertically, horizontally or diagonally. It is designed to control temperatures in wide adjustable ranges from 50 deg to 250 deg F and from 150 deg to 350 deg F. The simple straight through action of the thermal element to pilot valve eliminates need for critical levers and pivots, and makes possible easy disassembly and reassembly, if cleaning or service becomes necessary. *Fulton Sylphon Division, Robertshaw-Fulton Controls Company, Box 400, Knoxville 1, Tenn.*

Cable Reeling Unit

The Series 3 Spring-O-Matic Powereel, a continuous, heavy-duty cable reel with a compact retractable spring, easily adapts itself to all types of mobile electrical equipment. Its automatic operation simplifies and speeds up pay-out and take-up of electrical cables on hoists, cranes, thereby protecting the cables from tangling and unnecessary wear. It is available with either a plain or pivot base. The pivot base allows the reel to swivel over an arc of 330 deg on self-lubricating bearings. Approximate weight of the unit is 25 lb and its operation is based on 30 amp, 600 volt ac, 300 volt dc, 1 to 8 conductor collector rings. *Industrial Electrical Works, 1503 Chicago street, Omaha.*

Hook-On Volt-Ammeter

For measuring current on both insulated and non-insulated conductors without cutting the conductor or interrupting work, the volt-ammeter is equipped with scales that automatically change when the range selector knob is turned. The device is

A/C Cylinders too!

Another road tested application for wear resistant PORUS-KROME*

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Gaskets—Packings—Molded Rubber Rings for diesel locomotives . . .

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NOW pre-stocked in handy packages, ready for immediate shipment

Packaging and labeling diesel parts after inspection.

GARLOCK diesel replacement parts—gaskets, packings and molded rubber rings—are packaged in convenient quantities for ease in handling, storing and redistribution to shop men, overhaul shops and terminal points.

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Garlock diesel gaskets, packings, and molded rubber rings are giving completely satisfactory service on leading railroads. Specify Garlock diesel replacement parts and write us for complete parts-and-price list.

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GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS

designated AK-4 and includes 150/300/750 volts a-c as its volt ranges.

Current ranges of 10/30/100/300/800 amp a-c provide for the measurement of currents usually encountered in industrial circuits.

In measuring voltages, the screw-in voltage leads are connected into recessed terminals for operator protection. Then, the desired voltage range and scale is selected by turning the selector knob.

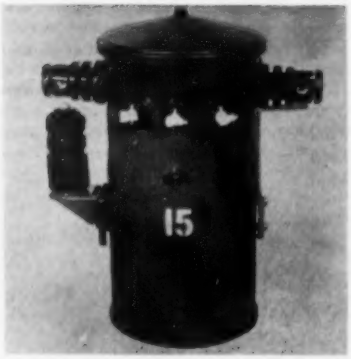
Uses for the device include checking circuits, motor overloads, and determining motor starting and running currents. It is said to be ideal for maintenance personnel. The unit operates on a frequency of 60 cycles with a 3-per cent full scale accuracy. *Instrument Division, General Electric Company, 1 River Road, Schenectady 5, N. Y.*

10-kva, 7,200-volt single-bushing unit

Distribution Transformers

A redesigned line of distribution transformers, said to be smaller, have larger ratings, improved sealing and fewer parts, have been made available. They are manufactured in single-phase ratings from 3 to 167 kva, 15,000 volts and below and in 3-phase ratings from 9 to 150 kva, 15,000 volts and below.

Almost 40 external bolts, clamps and lugs have been eliminated in these cover-bushing transformers, by improved tanks and handhole covers. The cover is secured by a single bolt threaded into an internal beam support. This bolt provides improved



15-kva 2,400-volt design

sealing by applying uniform pressure throughout the circumference of the corprene gasket.

New hanger and lifting lugs have straight sides that are welded directly into the tank wall. Its step-core design permits winding the coil closer to the core, giving a shorter mean turn to the coil. Other improvements include new high and low-voltage bushings, lightning arresters and arrester-mounting brackets.

The larger ratings have been designed to meet E.E.I.-N.E.M.A. requirements. Height reductions range from 22.7 per cent for the 25-kva rating to 13 per cent for the 37-½ and 50-kva ratings. *Westinghouse Electric Corporation, P.O. Box 2099, Pittsburgh 30, Pa.*

Jet Spray Cleaning Unit

Rapid cleaning of motors, compressors, condensers, machinery, engines, and small parts without the necessity of dismantling can be performed with this Steam Kleen jet sprayer.

The unit, Model No. 111, is operated by finger tip control. Changeover from wet to dry steam is instantaneous and is accomplished by merely tilting the device from horizontal to vertical position. Weight of the unit is 16 lb, ready for operation. It has a capacity of ½ gal of water and can

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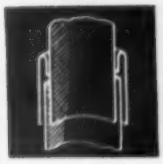
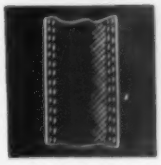
DOES MAKE BETTER
VESTIBULE DIAPHRAGMS
here's proof
50 years
in the
making!
Lasting, positive protection — the diaphragm that has proved to be the best!
NOW AVAILABLE
The new Morton DL-Pen-Flammable fabric for vestibule diaphragms. "Dynel" yarns, woven into a three-ply belting of Morton special 50-50 weave and then impregnated with black neoprene . . . a revolutionary, new material, highly resistant to strong detergents and soaps and inorganic acids, bases and salts. Excellent resistance to mildew fungus, fire and weather!

Leg-Ends Bound
Extra wear, longer life! Web-belting or chrome leather binding.



Exclusive Sectional Construction
Top section has 5 inch pockets into which leg sections fit — absolute weather protection.



Impregnated 3-Ply Belting—Special solution for self-lubrication against friction, acid, fire, water, mildew and rot!

Parts Replaceable
Separate top and legs effects real savings on replacements!

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Locomotive Cranes
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Look at your goggles — Do they have a Ks etched in the lens? If they do, you can go about your work secure in the knowledge that your eyes are getting the finest protection against industrial hazards that modern science can devise.

OTHER KIMBALL SAFETY PRODUCTS

EYE PROTECTION: Spectacle Goggles, Welding Goggles, Composition Goggles, Sideshields.

HAND PROTECTION: GLOVES: Welder's, Asbestos, Steel Stitched. MITTENS: Welder's, Asbestos, Steel Stitched.

BODY PROTECTION: CLOTHING: Wool, Flame-Proofed Cotton. LEGGINS and SPATS: Leather, Asbestos, Flame-Proofed Cotton.

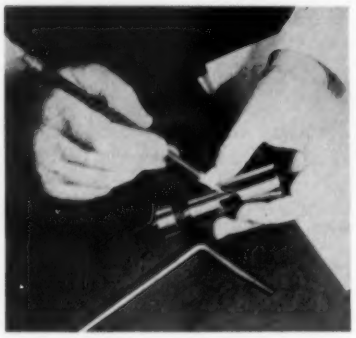
APRONS: Leather, Asbestos, Flame-Proofed Cotton.

Kimball SAFETY PRODUCTS COMPANY

9310 Wade Park Avenue • Cleveland 6, Ohio

be brought up to operating temperature and pressure in 20 min using cold water.

The cleaner is electrically heated, thermostatically controlled, and operates on any 110- and 115-volt circuit. It is fitted with a steam safety valve. *Henry Flow Control Company, Melrose Park, Ill.*

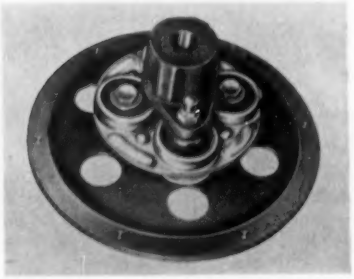


Drift Slot Tool Ejector

A trouble-free ejection method for spindle-type machine tools has been perfected. Specifications for the drift slots and line of standard Keyhole tool ejectors are now being offered designers of machine tools.

The manufacturer claims that this design eliminates damage to machine bearings and spindles often caused by hammering on conventional drifts. Slot design consists of a round portion which serves as a bushing for the key and a rectangular slot to permit use of conventional drifts should a tool or adapter become jammed in the spindle.

The cam-shaped tip of the ejector rotates against the top of the tang, pushing the tool from the spindle in one easy motion. There is no axial stresses or shocking hammer blows to destroy spindle alignment or damage bearings. The ejectors are available in five standard sizes for No 1, 2, 3, 4 and 5 Morse taper spindles. *Scully-Jones and Company, 1901 S. Rockwell street, Chicago 8.*



Flexible Coupling Units

These units attach to flywheels and are adaptable to a variety of industrial machinery drives where a tortionally flexible, shock resistant, weatherproof coupling for fly-

wheel-to-driveshaft connection is required.

The device, Morflex, has a standard coupling center member consisting of two steel stampings riveted together and enclosing four neoprene biscuits. A cast-iron adapter plate is bolted to one side of the center member and is attached to the engine flywheel through clutch bolt circle holes. A steel flange is bolted to the other side of the center member.

This design provides a tortionally flexible unit that is claimed to be easy to install and avoids vibration from misalignment and load reversal. The units require no lubrication or other maintenance and are not affected by oil, dirt, grease or water.

The couplings are made in two stock sizes. One size has an adapter plate that fits Ford overhead valve engines and Ford L-head industrial engines. The other fits Chrysler industrial engines. *Morse Chain Company, 7601 Central avenue, Detroit 10.*

Special Steel Plate

"T-1" steel is available in commercial plate size. It is said to have a yield strength three times that of ordinary carbon steel; excellent welding qualities without preheating; toughness at sub-zero temperatures; resistance to wear and impact abuse. Considering its high strength, the steel is relatively inexpensive, costing about 2-½ to 3 times more than ordinary carbon steel.

A special formula produces the toughness in the steel. Maximum benefits are derived from minimum quantities of the various alloying elements. Each is added with a distinct purpose in mind. According to the manufacturer, it is an all-purpose steel that was developed primarily to be used in plate form. Initial production will be for general industrial equipment, bridges, earth-moving and construction machinery. *Lukens Steel Company, Coatesville, Pa.*

Metal Equipment Spray Coating

This black coating, Bitumastic K, is made of processed coal tar pitch mineral filler, solvent and granulated cork. It requires no primer. One application gives a covering up to ⅛ in. in thickness, which it is said, provides protection from corrosion with a moderate degree of insulation.

The cork mastic was developed for use in locations where metal tanks containing heated materials require corrosion protection as well as insulation to prevent major heat losses. It may be used where massive insulation, installed at greater cost is not required. Such protection is suited for oil storage tanks, asphalt storage tanks or any metal tank, the contents of which are kept at temperatures up to 150 deg F. It can also be used to protect corrugated steel sidings and heating and ventilating ducts. *Tar Products Division, Koppers Company, Pittsburgh 19.*

(Equipment continued on page 154)

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Congratulations to the Frisco!

•

COMPLETELY RECLAIMED CASTINGS processed in our Modern Pyrometer-Controlled Oven Under A.A.R.-Approved Standards

•

We also repair, rebuild, and maintain tank cars and other freight cars.

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A modern shop regularly inspected by A.A.R.

Let us take care of your repair parts needs.

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Grinding Machines to handle crankshafts from the smallest up to those with a stroke of 16" and length of 200". Complete grinding service for locomotive crankshafts. Also camshaft repair service for locomotive engines.

Established 1924 . . . 31 years experience grinding crankshafts!

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Diesel Locomotives

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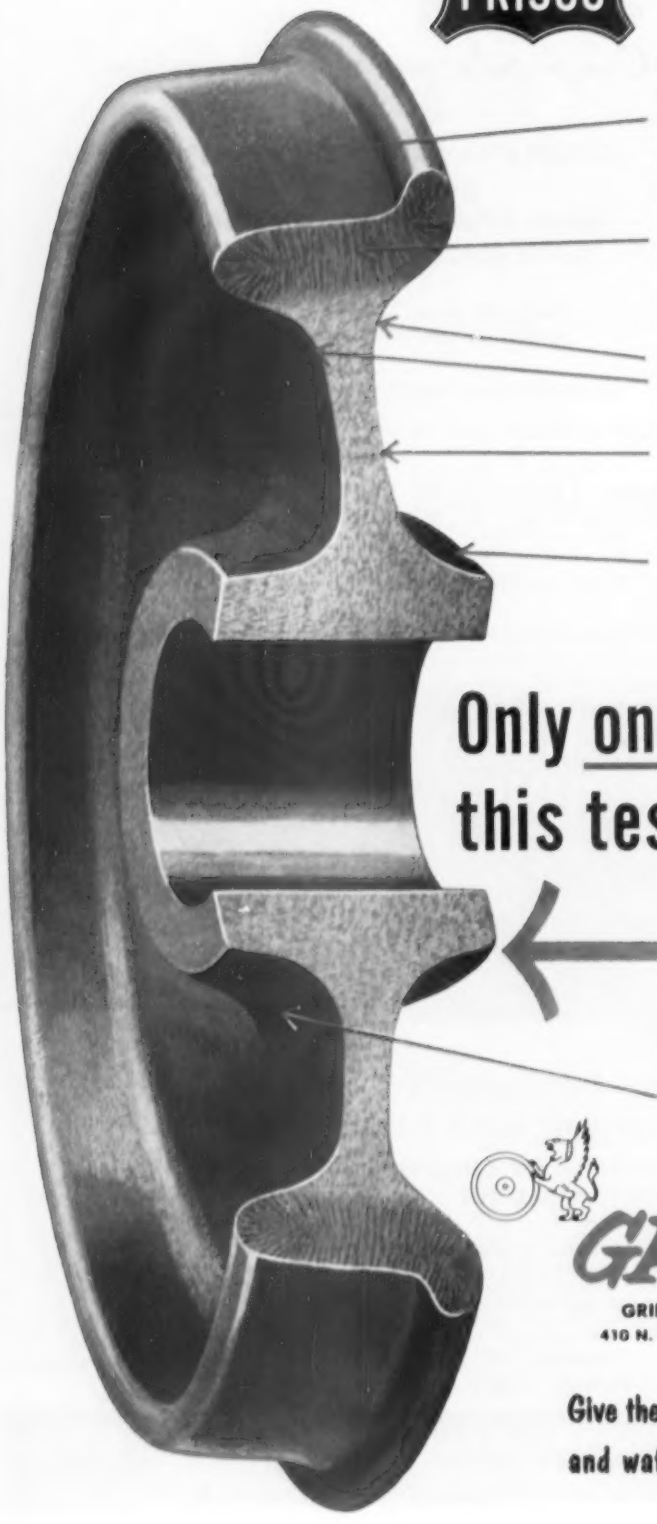
FRISCO

The Frisco is one of the progressive railroads now testing the Griffin EQS.



Roundness of EQS wheel is practically perfect—as-cast. No machining necessary . . . the toughest and longest-wearing metal is *on the tread, NOT in the scrap bin.*

Pressure pouring in graphite molds results in superior flange and tread wear. Note the directional solidification in flange and tread, shown as-cast: *the grain of the metal in EQS wheels is at right angles to the point of wear.*

Long sweeping fillets under flange and rim of EQS wheels insure greatest possible strength.

The Griffin EQS plate is of *uniform thickness*, dimensionally accurate in any section.

Now made of .75 carbon steel. Exclusive casting process used in producing EQS wheels permits use of recognized steel analysis that will best meet your requirements.

Only one wheel can pass this test with a score of

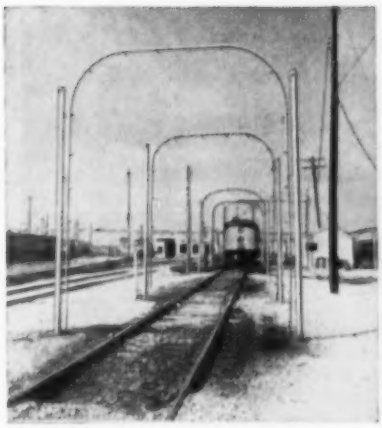
100

Location of hub and plate is identical in all EQS wheels; dissipation of heat is even, without developing internal stress.

GRIFFIN EQS
ELECTRIC QUALITY STEEL

GRIFFIN WHEEL COMPANY
410 N. Michigan Avenue, Chicago 11

Give the "green" to GRIFFIN... and watch your costs go down!



Pressure washing plant layout.

High-pressure spray stand.

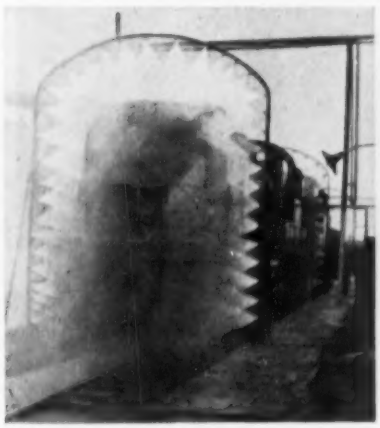
Cleans any contour.

Dearborn...the only system that cleans them all!

The Dearborn High-Pressure Cleaning System washes locomotives (road, switch, steam) and cars—regardless of contour. It automatically cleans tops, ends, sides and trucks; even wheels and bottoms, if desired. Dearborn Pressure Cleaning, when combined with mechanical brush washing, provides the ultimate in terminal passenger, locomotive and car cleaning.

ADVANTAGES: Saves time • Saves labor • Lowers cleaning cost per unit • Speeds up "terminal handling" operations.

Want proof? The coupon will bring complete details.



Washes road, switch and steam locomotives.

Cleans wheels and bottoms, also.

Pressure cleaning plus brush washing... an ideal combination.

"Serving the Frisco"

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PRESSURE CLEANING SYSTEMS

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Gentlemen: Please furnish complete details on the Dearborn Pressure Cleaning System.

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Railroad.....

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City.....Zone....State.....

Wolfe Brush Company

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Manufacturers for 103 years of high grade brushes for painting and cleaning purposes, especially designed for railroad and industrial users. For many years our brushes have helped successful operation of the "Frisco".

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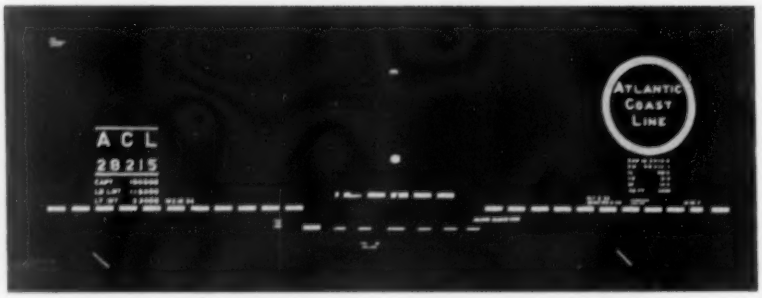


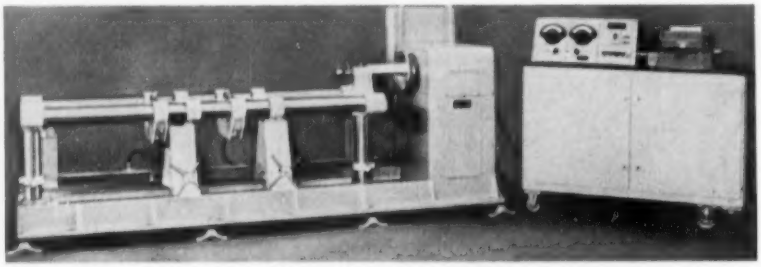
Reflective Lettering

Night accidents at grade crossings are said to occur more frequently as the result of motor vehicles running into the side of a train which blocks the crossing than as the result of the locomotive hitting vehicles on the crossing. There have been cases where a train has been hit by an automobile some fifty cars from the locomotive, resulting in the death of all occupants of the motor vehicle. When a train is made up of flats, gondolas, or pulpwood cars, its visibility to the driver of a highway vehicle may be extremely limited and confusing.

As early as 1948 the Atlantic Coast Line began exploring the field of reflectivity as a protective measure against such hazards of nighttime operation. The Prismo Safety Corporation was authorized to reflectorize several box cars of that road. The Prismo reflective material was applied to the large medallion, the numbers, and the railroad initials of these cars, and a dashed line was run along the bottom of each car. Subsequently, the same treatment was applied to several hundred additional cars, and today all ACL rolling stock, except passenger cars, is reflectorized. Greater safety is said to have resulted on the road and at highway crossings.

The reflectorized cars have offered other advantages in night operation in yards. Cars numbers are more easily identified when the cars are in motion, and the hazards from loose cars running down a track are reduced.

The ACL has also applied Prismo reflective material to station signs, whistle posts, mile posts, and all switch markings. *Prismo Safety Corporation, 301 Penn street, Huntingdon, Pa.*



Remote Control Balancing Machine

This unit furnishes a permanent record of unbalance. All controls and unbalance indicators can be located at any distance from the body of the static-dynamic balancer. The amount and angular location of unbalance in the work piece is indicated on two meters by a highly sensitive Electrodyne electronic indicating system.

Voltage take-offs are provided so that a permanent record of unbalance readings can be made automatically on special electric typewriters. Operation is reduced to push-button simplicity. *Tinius Olsen Testing Machine Company, 4096 Easton Road, Willow Grove, Pa.*

Screw-Lock Inserts

These inserts automatically grip the screw so that it is vibration-proof, and so ends any need for lock washers, locking wires, or lock nuts. They also provide a high strength thread according to the manufacturer and automatically anchors themselves into the parent material without the use of pins, rings, staking or other devices.

This insert can be used in an otherwise frozen design or production piece because it requires no more boss material or wall thickness than a conventional tapped thread. It can be used for products subject to vibration, temperature extremes, periodic inspection disassembly, etc.

The device is dimensionally stable over a wide range of temperatures and resists wear, corrosion, seizing and galling. It is said to provide strong, permanent threads in such soft materials as aluminum, magnesium and plastics. *Heli-Coil Corporation, Danbury, Conn.*

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Sealtite bolts are available with Lokrite Nut #2 (shown), or std. sq. and hex. nut

Standard Journal Box

(*Continued from page 93*)

oils to care for heavier loads, higher speeds, longer sustained runs at high speed, and higher rates of acceleration in starting.

In 1948, said Mr. Clark, the N&W initiated a cooperative program to find out if other types of oils could improve the hot-box situation. After some time spent in preliminary research, a dozen blends were developed containing various types of additives which might provide protection to bearings and journals under adverse operating conditions. After complete laboratory tests, several blends were field tested in comparison with other oils. Viscosity ranged from 200 to 650 sec at 100 deg F. Some were straight mineral oils and some had additives. The tests were run on several fully loaded 70-ton cars operating in a special train. The bearings were fitted with temperature recorders. The N&W thoroughly analyzed the results. Conclusions were as follows: (1) under normal conditions, lower viscosity oils resulted in lower temperatures; (2) higher viscosity oils gave better performance on rough journals; (3) boxes can operate on a minimum of five pints of oil; (4) seating or breaking in of bearing does not cause hot boxes; (5) premium oil with additives gave better performance than straight mineral oils, especially when cars were going slowly around curves. Temperatures with straight mineral oils increased rapidly, while additive oil kept temperature down.

The oil which showed up best was an additive type which meets all the physical tests of the present AAR Specification EM 906-50. The antiwear additive prevents excessive temperature rise in heavily loaded journals especially at slow speeds and around curves. The polar additive provides an adhesive lubricating film when bearings operate under borderline conditions, especially in summer. The -35-deg-F pour characteristics assure adequate lubrication at low winter temperatures. "It has about the best characteristics of any all-year oil we have developed to date," said Mr. Clark. It is being used by 14 railroads with improvements in hot-box records ranging from 45 to 95 per cent in miles per hot box set out.

"We do not feel," said Mr. Clark, "that any journal-box oil will be a panacea for all the hot-box troubles on a railroad. A good oil is only one of the factors.

"Although we feel that a premium car oil represents a substantial improvement . . . we do feel that a still better product could be made if economic factors were not too stringent.

"Regardless of what medium is used to get oil to a bearing, it is our conviction that oil quality in the long run will pay for itself."

Education that Fosters Teamwork

What caused the B&O freight-car journal box performance to be three times as good in 1954 as in 1942?

Searching for the answer, Mr. Seniff concluded that improvements in materials did not provide the answer in the face of a steady rate of dieselization. "We believe that more can be done to prevent hot boxes by education than by any other way," said Mr. Seniff. "To us, it means that the education starts at the top and works downward and literally through all the individuals who are in any way connected with the operation and maintenance of freight cars." Its essence is in the realm of human relationships and psychology. It maintains free channels for the flow of information from the bottom to the top, as well as from the top down. The supervisor of lubrication keeps these two-way channels open.

Everyone must accept the fact that the solid bearing will run without overheating (most of them do) if conditions are right, he said. The men and supervisors must know the "why" as well as the "how" of the work they do. Everyone must be sold that the standard method is the best. Education involves learning what is a well balanced and efficient force and how much time is required to do the job. Everyone must be convinced that the best materials are being furnished and that no source of information has been left unexplored.

Hot boxes on the morining report must receive immediate and uniform action, he said. The performance of servicing points must be compared and those with poor records must be helped to improve. Pride of accomplishment must be fostered at all levels. There is no substitute for good morale and teamwork.

Mr. Seniff expects the improvements to continue.

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ATTACHABLE STYLE *(Grounded)*
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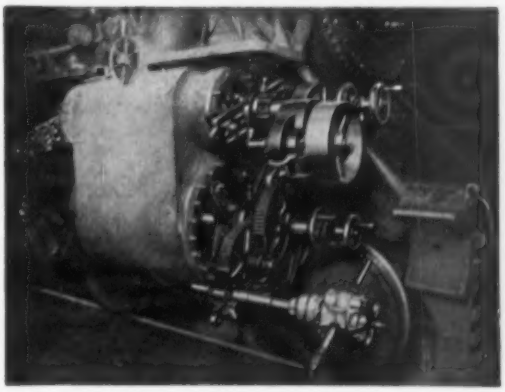
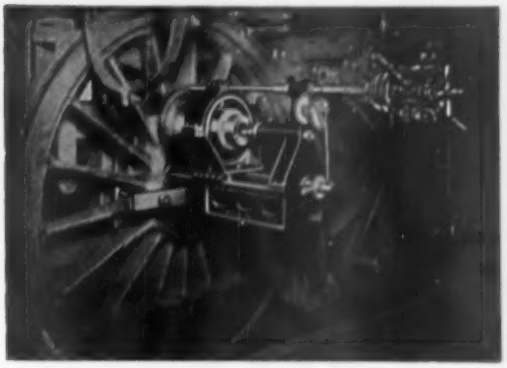


Left: The Underwood Boring Bar illustrated is designed for reboring all sizes of locomotive cylinders and valve chambers.

Below: The Underwood Portable Crankpin Turning Machine returning crankpin in position.



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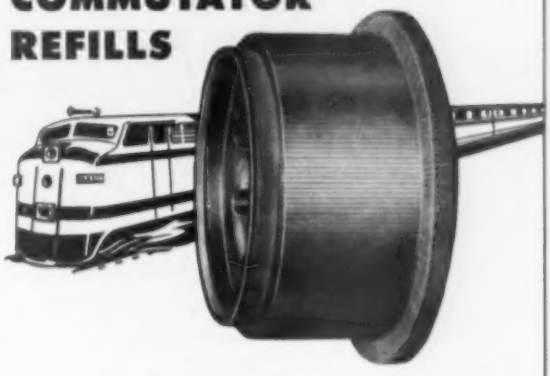

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New Sweeney Tool Removes E.M.D. Cylinder Heads and Liners with the Engine in the Locomotive.

Made by B. K. Sweeney Mfg., 1601 23rd St., Denver 17, Colorado, a practical, new maintenance tool is being offered for quick removal and installation of the cylinder heads and liners on E.M.D. 567, 567A, B, and C Engines. Called Sweeney Model 2700 Cylinder Head and Liner Hoist, so designed that one machinist can easily and safely remove cylinder heads and liners...while the engine is in the locomotive...saving man-hours and down-time and greatly reducing accident hazards.

Easy to operate, the Sweeney Hoist is built on a gear reduction principle with a power advantage of ten to one. It is easily positioned on two crab studs adjacent to each cylinder head. The machinist merely turns a two-position crank handle and guides the head or liner out of the bore. The Hoist pivots toward the aisle allowing the cylinder head or liner to clear the engine. Its roller bearing mounted, self-locking worm and gear keep the head or liner from free-falling. Movement of the crank handle enables the head or liner to be lowered to the floor for inspection and servicing.

Further information and price can be obtained by writing to the manufacturer (who is also maker of Sweeney POWERENCH Tools) at the address above.

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Linde Air Products Co., Division of Union Carbide & Carbon Corp. ... 36
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Midland Reclamation Co. ... 151
Miner, W. H. ... Front Cover
Motor Wheel Corporation ... 53
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Mortell Co., J. W. ... 138
Morton Mfg. Co. ... 149
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T. Z. Railway Equipment Co., Inc. ... 53
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Unit Truck Corporation ... Inside Front Cover
United States Rubber Company ... 52
Agency—Fletcher D. Richards, Inc.
United States Steel Corporation ... 4, 5, 12, 13, 32
Agency—Batten, Barton, Durstine & Osborn, Inc.
Van Der Horst Corp., The ... 147
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Agency—W. L. Towne Advertising
Waugh Equipment Co. ... 31
Western Railway Equipment Co. ... 159
Westinghouse Air Brake Company ... 2
Agency—Batten, Barton, Durstine & Osborn, Inc.
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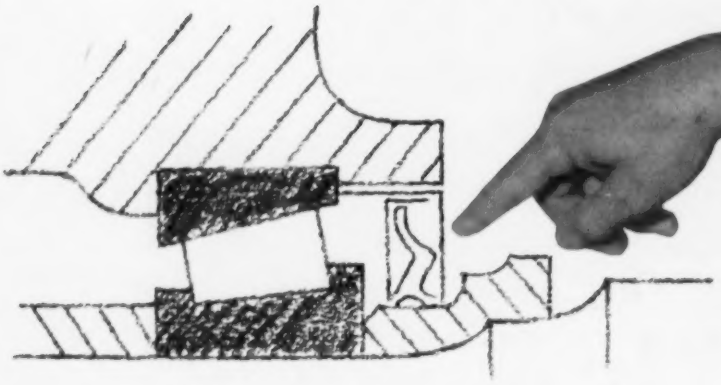
This month Dr. Oscar Horger demonstrates advantage of no lateral movement



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1. No lateral movement within the bearing. Incessant lateral movement of straight roller bearings scuffs rollers and races, shortens bearing life. It also pumps lubricant through the seal and out of the journal box, draws in dirt and water. And the auxiliary devices needed to take the thrust loads of lateral movement aren't completely effective, are hard to lubricate with grease.

The taper in Timken® bearings prevents lateral movement, enables them to take both thrust and radial loads. Always rolling the load, Timken bearings eliminate scoring, scuffing and pumping. They end the hot box problem. Less lubricant and maintenance are needed. Bearing life is increased.

2. Positive roller alignment. The taper holds roller ends snug against the rib, where wide area contact keeps rollers properly aligned. Rollers can't skew to upset full line contact or shorten bearing life.

When you switch to roller bearings to end hot boxes and cut costs, remember: Timken is the only journal bearing you can fully count on to end the hot box problem and cut operating and maintenance costs to a minimum—it's the taper! The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

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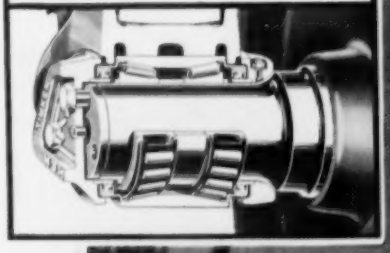
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